

**INTEGRATING PERSPECTIVES  
ON SOCIAL VULNERABILITY TO DISASTERS  
AND EMERGENCY MANAGEMENT  
IN PUERTO RICO**

by

Jennifer Marie Santos Hernández

A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Sociology

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## TABLE OF CONTENTS

LIST OF TABLES .....	ix
LIST OF FIGURES .....	x
ABSTRACT .....	xii
Chapter	
1 INTRODUCTION .....	1
2 DEFINING SOCIAL VULNERABILITY.....	3
2.1 Disasters as the Outcome of Pre-Existing Social Vulnerability .....	5
2.2 Max Weber and the Study of Bureaucracies .....	6
2.3 Disaster Research in Puerto Rico .....	11
2.4 The Puerto Rico Commonwealth Emergency Management Agency .....	14
3 METHODOLOGY .....	23
3.1 Background.....	23
3.2 Research Scope and Questions .....	24
3.3 Field Research .....	26
3.4 Case Study of the Municipality of Cataño .....	28
3.5 Formal and Interactive Interviews in Cataño .....	29
3.6 Strengths and Challenges of a Qualitative Approach.....	32
3.7 Archival and Online Research.....	33
3.8 Analysis of Formal Interviews .....	34
3.9 Analysis of Political Shifts and Emergency Management .....	39
3.10 Conclusion: Multiple Methods of Research .....	40
4 LOCATING SOCIAL VULNERABILITY TO DISASTERS: PUERTO RICO AS THE CASE STUDY SITE.....	41
4.1 Puerto Rico’s Geographic Location and Natural Hazards.....	43
4.2 Puerto Rico in the World System .....	49
4.3 Impact of the New Deal in Puerto Rico.....	52
4.4 Establishment of the Commonwealth of Puerto Rico and Post-War Development .....	54
4.5 Development Outcomes: The Puerto Rican Paradox .....	55

5	THEORY: MAX WEBER AND THE RATIONALIZATION OF MODERNITY .....	60
5.1	Organizational Theory.....	62
5.2	Max Weber’s Theory of Rationalization.....	63
5.3	Weber’s Study of Bureaucracies .....	64
5.4	The Ideal Type of Bureaucracy .....	66
5.5	Levels of Analysis and Flexibility in Organizational Thinking .....	67
5.6	Theoretical Roadmap.....	69
6	THE PUERTO RICO EMERGENCY MANAGEMENT AGENCY AS AN IDEAL TYPE OF BUREAUCRACY.....	71
6.1	The Early Years of Civil Defense in Puerto Rico .....	73
6.2	The Structure of Emergency Management in Puerto Rico.....	84
6.3	Decision-Making: Conflict Structures in Emergency Management.....	86
6.4	Political Shifts .....	87
6.5	Emergency Management and Policy Transfers.....	89
6.6	Funding.....	93
6.7	Summary.....	95
7	DEVELOPMENT, RISK, SOCIAL VULNERABILITY TO DISASTERS, AND EMERGENCY MANAGEMENT IN CATAÑO, PUERTO RICO.....	97
7.1	Field and Archival Research .....	101
7.2	How the Municipality of Cataño Emerged and Evolved?.....	104
7.3	Cataño During the 1930s Economic Crisis .....	107
7.4	Defending the Empire: Military Bases and Land Transformation .....	109
7.5	The Modernization of Manufacturing and Energy Sources .....	110
7.6	Housing Projects.....	112
7.7	Flooding.....	115
7.8	Industrial Activity and Environmental Struggle.....	116
7.9	Current Demographic and Socio-Economic Characteristics .....	117
7.10	The Caribbean Petroleum Corporation.....	119
7.11	The CAPECO Explosion.....	122
7.12	Emergency Response.....	123
7.13	Limited Community Information .....	125
7.14	Recovery and the Reproduction of Vulnerability.....	126
7.15	Concluding Remarks: Contrasting Perspectives in Emergency Management .....	129
8	CONCLUSION: EMERGENCY MANAGEMENT IN PUERTO RICO AS A BUREAUCRATIC TYPE.....	132

REFERENCES ..... 139

Appendix

A EMERGENCY MANAGEMENT INTERVIEW PROTOCOL ..... 154

    A.1 Introduction ..... 154

    A.2 Weather Information Sources ..... 155

    A.3 Weather Information and Decision Making ..... 155

    A.4 Weather Information: Precision, Accuracy, and Reliability ..... 156

    A.5 Public and Organizational Communication ..... 157

    A.6 Risk Communication and the Media ..... 157

    A.7 Severe Weather Warnings: Problems, Challenges, and Solutions ..... 158

    A.8 Technological Innovation, and End-User Needs and Characteristics ... 159

    A.9 Public Policy Issues ..... 160

    A.10 Summary ..... 160

    A.11 Conclusion ..... 160

B INFORMED CONSENT FORM ..... 161

C CHRONOLOGIES ..... 163

    C.1 Chronological Evolution: Major U.S. Disaster and Emergency  
        Management Policies ..... 163

    C.2 Federal Emergency Management Directors ..... 172

    C.3 Chronological Evolution: Puerto Rico Disaster and Emergency  
        Management Policies and Official Documents ..... 173

D HUMAN SUBJECTS REVIEW BOARD APPROVAL ..... 193

## LIST OF TABLES

Table 2.1:	Directors of the Puerto Rico State Agency for Emergency Management and Disaster Administration .....	17
Table 3.1:	Field Research .....	26
Table 3.2:	Study Participants.....	27
Table 4.1:	Major Hazards Events in Puerto Rico’s History.....	46
Table 6.1:	Hurricane San Ciriaco and Hurricane San Felipe Comparison.....	74

## LIST OF FIGURES

Figure 2.1:	Research Scope: Situational Approach to Emergency Management .....	9
Figure 2.2:	Social Vulnerability Index Map for Cataño, 2000 .....	12
Figure 3.1:	Triangulation Diagram .....	33
Figure 4.1:	Mean Annual Precipitation Estimates (National Weather Service, San Juan Forecasting Office).....	45
Figure 6.1:	Number of Emergency Management Laws 1940-2011.....	72
Figure 6.2:	Commonwealth Emergency Management Agency (Number of State and Regional Managers).....	80
Figure 6.3:	Puerto Rico Emergency Management System .....	86
Figure 6.4:	Funding Sources in 2002 .....	94
Figure 6.5:	Funding Sources in 2011 .....	95
Figure 7.1:	Wisner's Pressure and Release Model .....	99
Figure 7.2:	Map of Communities in Cataño .....	102
Figure 7.3:	Map of Cataño and San Juan Metropolitan Area .....	105
Figure 7.4:	Picture of the Punta de Cataño Parish Ruins .....	106
Figure 7.5:	Picture of Squatter Settlement in Cataño.....	111
Figure 7.6:	Picture of Barriada Juana Matos.....	113
Figure 7.7:	Picture of Matienzo Cintrón Housing Project - Oldest Housing Project in Cataño .....	114
Figure 7.8:	Picture of a Building at Juana Matos II Housing Project .....	115
Figure 7.9:	Picture of the Fuel Pipeline that connects the Puma Fuel Storage to the Power Generating Facilities .....	120

Figure 7.10: Fuel Storage Facility Fire .....	121
Figure 7.11: Aerial View of CAPECO Storage Facility .....	122
Figure 7.12: Picture of the Puente Blanco Community .....	129

## **ABSTRACT**

As economic losses associated to disasters continue on the rise, the study of disasters continues to show that the causes of these events are fundamentally social. In a macrocosm, this dissertation explores how the practice of emergency management may impact, address, or fail to address social vulnerability to disasters at the community level. This research explored how the emergency management organization evolved, how it functions, and how their services are delivered. In addition, it presents a case study of the 2009 explosion at a fuel storage facility in Cataño, Puerto Rico. This case study moves beyond inventories of indicators of social vulnerability to explore the interaction between the emergency management organization and community units during crisis and non-crisis times. Max Weber's ideal type of bureaucracy was used as a conceptual tool to guide the analysis and to explore management changes. The findings provide insights that could assist practitioners and researchers working in the areas of development, emergency management, bureaucratic change, decision-making, and policy making.

## **Chapter 1**

### **INTRODUCTION**

This dissertation is focused on social vulnerability to disasters and emergency management in Puerto Rico. In a macrocosm, this dissertation explores how the practice of emergency management may impact, address, or fail to address social vulnerability to disasters at the community level. To do so, an evolutionary approach was adopted and mixed methods were employed. The focus of this research was not to test a particular theory. Instead, I used theory to guide my research in a way that allowed me to explore social vulnerability and organizational change. This research placed the emergency management organization within the larger context of Puerto Rico to explore how the organization emerged, how it evolved, what is its structure, how that structure shapes preparedness efforts, and how the emergency management bureaucracy relates to broader issues of stratification and inequality. This research provides insights that could assist practitioners and researchers working in the areas of development, emergency management, bureaucratic change, decision-making, and policy making.

The dissertation manuscript is divided in seven chapters. Chapter 2 describes and discusses the value and limitations of static and dynamic approaches to vulnerability, familiarizes the reader with previous disaster research in the context of Puerto Rico, provides an overview of the emergency management organization, and presents the objectives and research questions. Chapter 3 presents the methodology. Chapter 4 presents an overview of Puerto Rico's political and economic development.

Chapter 5 discusses Max Weber's concept of bureaucracies and its value as a guiding framework. Chapter 6 presents a discussion of emergency management in Puerto Rico particularly focused on whether the organization is recognizable using Max Weber's approach to bureaucracies on matters related to decision-making, hiring, external politics, and organizational outputs. Chapter 7 presents a case study of the urban development, population dynamics, and evolution of risks in the municipality of Cataño. Special attention is given to the 2009 explosion at the Caribbean Petroleum Corporation (CAPECO-now owned by Puma Energy). Chapter 8 presents the conclusion and a summary of the main themes discussed in the dissertation manuscript.

## **Chapter 2**

### **DEFINING SOCIAL VULNERABILITY**

The study of social vulnerability to disasters has generally focused on understanding how social stratification relates to disasters and how social forces can create the possibility of a hazard to become a disaster. Ben Wisner, Piers Blaikie, Terry Cannon, and Ian Davis assembled a working definition of social vulnerability as they were studying the famine that unfolded in the Sahel from 1967 to 1973. In the seminal book *At Risk: Natural Hazards, People's Vulnerability and Disasters* (2004), Wisner and his colleagues defined social vulnerability as “the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard”. Their definition includes the difficulties and chances that people may encounter as they mitigate, prepare for, deal with, respond to, and recover from the impact of a natural hazard. Handmer and Monson (2004) points out that many of the determinants of vulnerability fall under the protection of human rights.

There are numerous definitions of social vulnerability (including Chambers 1989; Pelling 2003; Turner et al, 2003; Wisner, et al. 2004; UN/ISDR, 2004; and Cardona, 2004, among others). There is no firm definition of vulnerability, rather, it can be considered as an evolving concept. There are some general assumptions associated with the concept. Vogel and O'Brien (2004) argue that vulnerability is multidimensional, scale dependent, and dynamic. The concept highlights how the

effects that may be experienced or not experienced by an individual or group may relate to the experiences of others.

For the purpose of my research, I divide applications of the concept of social vulnerability into those that operationalize vulnerability as a “state” and those that operationalize social vulnerability as a “dynamic”. Applications that operationalize vulnerability as a state predominantly use some set of variables to generate an inventory of at risk populations (Morrow, 1999; Peacock, Morrow, and Gladwin, 1997; Cutter, 2003; Santos-Hernandez, 2007; Van Zandt, et al., 2012, among others). Approaches that focus on identifying at risk populations have examined a number of demographic and socio-economic variables including race, ethnicity, class, gender, age, employment, literacy, housing tenure, disabilities, political representation, and vehicle tenure. Applications that operationalize social vulnerability as a dynamic focus on understanding how physical exposure, social morphology, and the political economy of a place explain disaster experiences and relative outcomes (Blaikie, 1994; Pelling, 1997, Pulwarty and Riebsame, 1997, Klinenberg, 2002; Aguirre, 2007; Laska and Morrow, 2006; Jones and Murphy, 2009, among others). Other scholars within what can be considered as dynamic approaches focus on the creation and evolution of risks, social structures, and in the political economy of a place (Oliver-Smith, 1994).

This chapter discusses the value and limitations of static and dynamic approaches to vulnerability, presents the research questions that guide this research, localizes those research questions within an overview of disaster research in Puerto Rico, provides the reader with an overview of the emergency management organization (e.g. its structure, supporting legal and policy documents, and functions),

and highlights the importance of understanding processes of political, social, and economic changes as a way to lay bare the dynamics of social vulnerability

## **2.1 Disasters as the Outcome of Pre-Existing Social Vulnerability**

In 1983 James Hewitt (1983) critiqued the classic approach to disasters and stressed that disaster research is not guided by theory. As other scholars have also argued, Hewitt pointed out that disaster research emerged as a reaction to funding opportunities provided by governments and institutions interested in controlling resources. Hewitt argued that the classic approach to disasters overlooks the pre-existing social structures and how those may shape disasters experiences.

The conceptualization of disasters as the outcome of the pre-existing vulnerability of a place departs from traditional conceptualizations in which disasters were perceived as crisis events constrained in time and space, generated by a disruption to social systems, and caused by external man made or natural agent(s). The social vulnerability approach also offers a perspective grounded in conflict theory that extends the conceptualization of disasters as pro-social events. While pro-social behaviour and consensus is observed during disasters, researchers have also observed that individuals and groups continue to be socially stratified as crisis events unfold (Nigg, Barnshaw, and Torres, 2006).

Despite its focus on process, applications of the concept of vulnerability in research often fall short in capturing the elements and dynamics of social vulnerability. Static approaches to social vulnerability are useful for identifying people living in a condition of disadvantage. However, when using secondary data, they often do not capture human adaptations and interactions; nor do they examine the evolution of social arrangements or the progression of social processes. Static approaches to

vulnerability often result in some sort of recipe or list of factors that are quantified to characterize vulnerability as a function of a number of demographic and socio-economic characteristics. That kind of approach makes it difficult to understand how the social morphology may combine with the physical exposure, and the political economy of a place, to produce a condition of social vulnerability.

The problem with static approaches to vulnerability is that they can commit the logical fallacy of interpreting aggregate values and characteristics as indicative of individual capacity. What static approaches can tell us is the concentration of people with certain characteristics in a place. But, a static approach is limited in explaining how those characteristics affect individual capacity, interactions, and disaster management. Using such a static approach can be counterintuitive and misleading to practitioners because they may overlook social relations and the needs of people living in areas where they could be a small, but extremely disadvantaged minority. Those approaches can exacerbate vulnerability by providing an incomplete and fallacious account that could be used for policy making. A dynamic approach is valuable in that it focuses on social actions, interactions, decisions and on how those fuel constitutive social processes. In other words, dynamic approaches may allow us to see how through interactions we reproduce a system that renders certain individuals and groups more vulnerable to disasters.

## **2.2 Max Weber and the Study of Bureaucracies**

The primary focus of the work of German sociologist Max Weber is social action. Social action can be defined as “a type of behavior that is oriented to the behavior of another actor, to which the actor attaches meaning” (Swedberg, 2005). Weber’s overarching interest was to explain how social action in modern societies

differs from that in traditional societies. Weber claimed that with the increase in rationalization, human beings came to be more aware and concerned with efficiency and with the adoption of goal-oriented rationality. With the increase in rationalization, Weber argued that behavior becomes less dominated by affective and traditional types of social action.

In order to study bureaucracies, Weber developed an ideal type of bureaucracy. Weber's ideal type of bureaucracy serves as a tool to examine social institutions. To study authority he identified three types of authority: traditional authority, charismatic authority, and rational-legal authority. In pre-modern societies traditional authority dominates social relations. Traditional authority is passed through heredity and perpetuates the status quo. Charismatic authority facilitates social change. Charismatic leaders rely on the support of others and can challenge the current bureaucracy. Bureaucrats cannot do this because they must follow the rules of conduct of the bureaucratic organization (Weber, 1946). Rational-legal authority relies on legally established impersonal rules. This type of authority goes hand in hand with the increase in instrumentally rational social action and is characteristic of modern societies. Weber's propositions on authority serve as the basis for his discussion on bureaucracy.

Max Weber (in Gerth and Write Mills, 1946), characterized modern bureaucracies as structures that were superior to any other form of social organization in the pursuit of specified goals. Bureaucracies:

- 1) Have strict jurisdictional areas which that are generally ordered by laws.

- 2) Separate public and private property. The resources of the office are for the completion of duties associated to the employment.
- 3) Officials receive a salary to perform regular activities for those governed and those activities are distributed among bureaucrats using an official pre-established method.
- 4) Authority to give commands is distributed in a hierarchical way and mechanisms of coercion are available to officials in order to assure stability.
- 5) There is an established method to determine citizenship and to determine the qualifications that grant eligibility for employment in the bureaucracy.
- 6) Employment in the bureaucracy is long-term and secured.

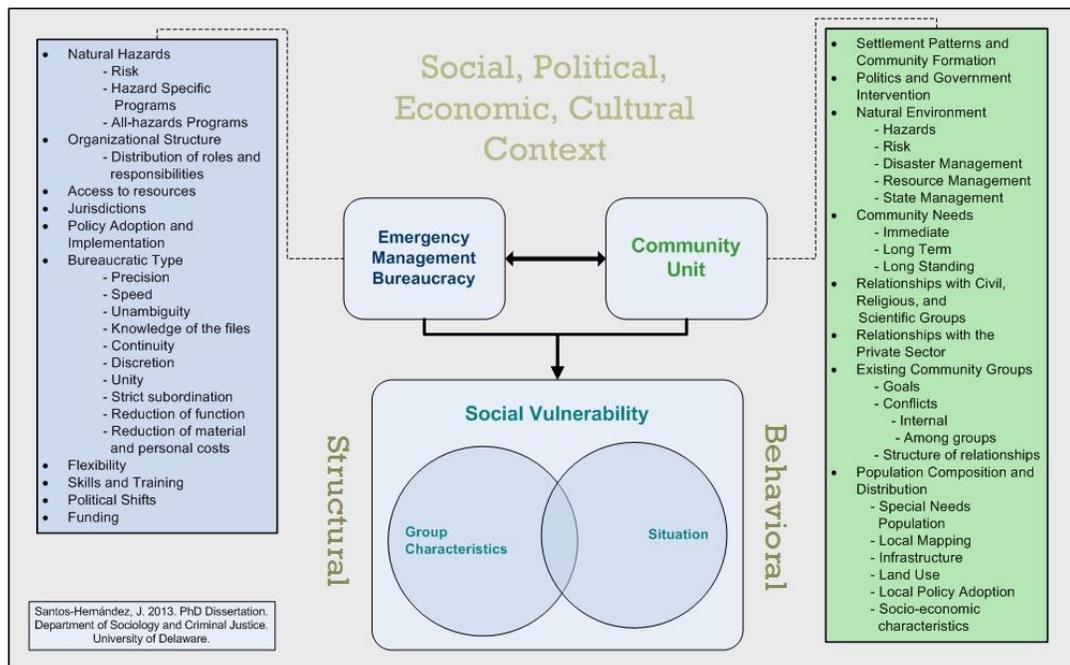
The bureaucracies studied by Weber were different from the ones we study today. Weber lived through a particular time in the history of Germany, when Otto von Bismarck was able to unify a German Empire. Moreover, Weber did not consider how a bureaucracy may evolve under the rule of an Empire. This research extends the conceptualization of bureaucracy offered by Weber by studying how the emergency management bureaucracy in Puerto Rico evolves under the auspices of the local and federal government, and how that bureaucracy interacts with local communities.

The goal of the Puerto Rico Emergency Management Agency is not to reduce social vulnerability to disasters but to protect life and property. Although policies focused on preparedness and mitigation have increased, those same policies construct disasters as resulting from the impact of an external agent. However, the communities served sometimes have larger social problems that are perceived as more important

and that impinge upon their preparedness and mitigation decisions (López-Marrero and Yarnal, 2010). In this dissertation I sought to understand how the emergency management bureaucracy has evolved and how bureaucrats interact with community members. My research in the municipality of Cataño serves as a non-generalizable case study that allows me to explore that interaction in a more manageable way.

Figure 2.1 presents a visualization of the scope of my research. As it can be observed, I wanted to move beyond taxonomic approaches to social vulnerability. Instead, I wanted to qualitatively explore the relationship between the emergency management bureaucracy and a community unit. Moreover, I wanted to locate that relationship in a social, political, cultural and historical context.

Figure 2.1: Research Scope: Situational Approach to Emergency Management



Lewis (1980) challenged the classic conceptualization of disasters by arguing that disasters originate in the underlying processes of change taking place in society. The idea is that processes of social change may result in a condition of vulnerability. The vulnerability of an individual or group results from a dialectical process in which the totality of risks and the effects that may be experienced at a given point in time are produced, in which the totality of the efforts to reduce and respond to risks are created, and in which the transformed social organizations adapt to changes (Aguirre, 2007). This dynamic perspective focuses on how social forces produce disasters and how those forces are continually at work, even during disasters themselves; highlighting the importance of the principle of continuity in disasters (as discussed by Quarantelli and Dynes, 1977).

At the community level, disaster preparedness is a concern among many others that are often considered more important because of their immediacy. López-Marrero and Yarnal (2010) explored the importance given by residents of two flood-prone communities, located in East Puerto Rico, to disaster preparedness and mitigation measures in light of other concerns. They found that while preparedness and mitigation were a concern, they were not a primary concern. Instead, residents were more concerned about issues of health and employment. Those findings support the notion that people make choices and decisions related to disasters taking into account a larger set of individual and collective concerns. This is the case not just for residents but also for upper-level decision makers and local managers. It is important to understand what those concerns are and how they come into play when making decisions.

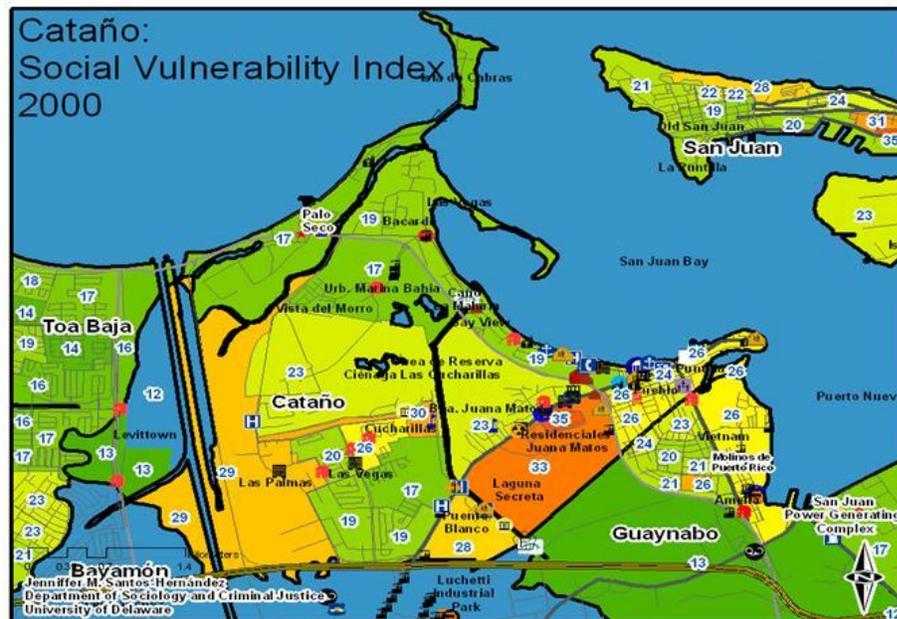
Gaining a better understanding of disasters and emergency management as processes allowed me to better understand how the organizational features of Puerto Rico could impinge upon the social vulnerability of the local population. In this dissertation I explored the process through which meso-level institutions interact with communities. Chapter 6 presents a more detailed analysis of the evolution of emergency management in Puerto Rico. Chapter 7 presents a case study of social vulnerability at the community level. This research moves the discussion of social vulnerability to disaster in Puerto Rico from one focused on “factors”, to one focused on interactions and dynamics among emergency managers and communities in a pre-existing condition of vulnerability. The value of adopting a dynamic approach is that it allows us to delve into the process through which capacities, vulnerabilities, and risks are co-created.

### **2.3 Disaster Research in Puerto Rico**

In the case of Puerto Rico, a social vulnerability index was calculated for coastal municipalities (Santos-Hernandez, 2007). Map 1 shows as an example the social vulnerability index values for the municipality of Cataño in 2000. These values tell us more about issues of development and their effect on population distribution, than about the capacity of individuals or communities to prepare for a disaster. For example, the index often shows a concentration of “vulnerable areas” around deindustrialized areas. While these areas show a concentration of residents living with characteristics of disadvantage, these results cannot show that those individuals are more vulnerable than those with similar characteristics who live in other areas. Social vulnerability indexes work as inventories that provide information about areas where there is higher concentration of people with certain characteristics. Therefore, it is

important to highlight that the characteristics observed by aggregate level indexes do not necessarily apply to individuals. This dissertation seeks to gain a better understanding of social vulnerability as a process.

Figure 2.2: Social Vulnerability Index Map for Cataño, 2000



Although this dissertation is an exploratory case study of social vulnerability and emergency management in Puerto Rico, the findings of this research are relevant to a broader domestic and international community. Moreover, this research presents an initial account on social vulnerability and emergency management in Puerto Rico that can be revised, refined, or even discarded by other researchers interested in this area. To some extent, distinct political arrangements and demographic characteristics make Puerto Rico a unique case, but the value of the human ecology framework is its capacity to describe how variation in decision making is influenced by environmental and social forces.

The findings of this research provide very valuable insights on how decisions are informed by contextual factors. Puerto Rico has become a scenario in which the contradictions of development can be observed. Rivera-Batiz and Santiago (1996) described the situation in the island as paradoxical. While the income and the quality of life of Puerto Ricans improved dramatically through the creation of numerous development programs (Rivera-Batiz and Santiago, 1996; Rodríguez, 1997), industrialization did not generate the amount of jobs expected (Ammot and Matthaei, 1996), full integration of Puerto Rico into the international economy was not possible (Alameda, 2003), and close to half (45%) of the island population is still impoverished (U.S. Census, 2000; Colón Reyes, 2004). A focus on Puerto Rico, historically referred to as a “social laboratory”, affords us an opportunity to understand several social processes and global dynamics that are observed in other developing countries.

Rodriguez (1997) argues that Puerto Rico is an urban/industrial society with high levels of population density and a disproportionate concentration of residents in hazard-prone areas. Aguirre and Bush (1992) argue that at the organizational level, government agencies in Puerto Rico are vulnerable to dramatic changes as a result of elections. Nevertheless, despite the disproportionate concentration of residents in hazard-prone areas, despite the known challenges resulting from rapid development and poverty, current research on the social aspects of disasters and emergency management in Puerto Rico is limited (exceptions include Palm, R.I., Hodgson, M.E. 1993; Aguirre, B.E., Bush, D. 1992; Rodríguez, H., Troche, M. 1994; Gutierrez, 1995; Pérez-Lugo, 2001; Diaz, et al., 2007; Lopez-Marrero, T., Yarnal, B., 2010).

As it is in the United States (Tierney, 2007), disaster research in Puerto Rico is nurtured by researchers who either focus their career on disasters, others who make

sporadic contributions, and others that get involved in disaster research episodically after an event affects the geographic area in which they work. As it is in other areas, in Puerto Rico funding for disaster research is disproportionately focused on the physical aspects of environmental hazards and extreme events (Bush, et al., 2009, Moya and Mercado, 2006, Huérfano, et al., 2005, Mercado and McCann, 1998, Larsen and Torres, 1992, Molineli-Freytes, 1990, among others).

Although the importance of the social aspects of disasters is recognized by the local scientific community, research mostly focuses on physical or technical questions that undermine the importance of systematically studying the social aspects of disasters. The effort of physical scientists to recognize the importance of the social dimension often translates into calls for, or into the development of top-down education programs to solve the vulnerability of the population. Nevertheless, there is a need to better understand what the needs of local communities are, and how those needs contrast with the capacities, challenges, culture, and efforts of residents and emergency managers.

#### **2.4 The Puerto Rico Commonwealth Emergency Management Agency**

The history of the Commonwealth Emergency Management Agency (PREMA) in Puerto Rico is very much tied to that of the United States. Originally, PREMA was known as the Puerto Rico Civil Defense Corp. In the aftermath of the Pearl Harbor attack (1942) and under the presidency of Roosevelt, then Governor Rexford Tugwell established the Civil Defense Corp. Puerto Rico was one of the first sites to have a civil defense organization. The island was an important site of U.S. military installations in the Caribbean (Enders, 1985). Some of the initial meetings to discuss

the importance of the initiative for the United States took place in San Juan (University of Puerto Rico, Digital Archives).

During the Second World War, several programs were deployed by Carlos Muñoz McCormick, director of the Civil Defense Corp at the time, to recruit volunteers and to educate residents on the protective actions that had to be taken in the event of radioactive rain. According to the Office of Public Documents of the Emergency Management Agency, approximately 65,000 volunteers were recruited at the time. The central office of the Civil Defense Agency was located at the San Cristobal Fort in Old San Juan; highlighting the ascribed defense and national security responsibilities of what was, nevertheless, a small government organization.

One of the first pieces of disaster legislation in Puerto Rico is Law 33 of April 16, 1942. It provided the guidelines for the establishment of the Puerto Rico Civil Defense. Before the establishment of the civil defense, local emergencies were addressed by residents themselves. Larger disasters were mostly addressed by the central executive government with the assistance of the Federal government. For instance, Puerto Rico benefited from the federal approach to the 1930s Great Economic Crisis through the benefits offered by the Federal Emergency Relief Administration (FERA). Thus, in 1933 the Puerto Rico Emergency Relief Administration (PRERA) was established to serve as the local liaison with the FERA. The PRERA program was particularly relevant to the history of emergency management because it provided resources to those affected by hurricanes San Nicolás in 1931 and San Ciprián in 1932. Hurricane San Nicolás caused significant damages to the agricultural sector, and over twenty five thousand residents were homeless after Hurricane San Ciprián. An offset of the Puerto Rico Emergency Relief Administration

was the creation of the Puerto Rico Reconstruction Administration established in 1935. Through this program the first government sponsored cement plant was established, facilitating the construction of new infrastructure and stronger cement homes. However, the economic bonanza was short lived and when federal funds for the Puerto Rico Reconstruction Administration subsided at the end of the 1930s, most of those employed under the program were laid off.

In addition to the economic transformations, as Puerto Rico became a formal unincorporated territory of the United States under the Free Associated State or the Commonwealth Agreement, finalized on July 25, 1952, all legislation was adapted to follow federal guidelines. This was also the case for the local Civil Defense Agency. On May 1, 1951, Law 183 went into effect, modifying the local agency to follow the structure and policies of the Federal Civil Defense Organization. As the local government structure evolved, new mechanisms emerged to strengthen security and civil protection resources. For example, on June 1, 1966, under the governorship of Roberto Sánchez Vilella, a Law establishing the Puerto Rico Emergency Fund was signed.

The 1970s were very important for the development of the emergency management organization. Under the governorship of Rafael Hernández Colón the central office of the emergency management organization moved from the historic San Felipe del Morro Fort in San Juan to a larger facility. In 1973 a civilian, Edma Santiago de Hernández, a member of the Popular Democratic Party General Council, instead of a military official, became the first woman civilian appointed as the director of the Civil Defense. Table 2.1 presents the list of directors for the Puerto Rico Civil Defense and Emergency Management Agency.

Table 2.1: Directors of the Puerto Rico State Agency for Emergency Management and Disaster Administration

<b>Name</b>	<b>Term of Office</b>	<b>Governor</b>	<b>U.S. President</b>	<b>Party</b>
Dr. Carlos E. Muñoz McCormick	1942-1944	Rexford G. Tugwell	Franklyn D. Roosevelt	Appointed by Franklyn D. Roosevelt (Democratic)
Col. Olimpio Díaz	1944	Rexford G. Tugwell	Franklyn D. Roosevelt	Appointed Governor (Democratic)
Col. Wilson P. Colberg	1945	Rexford G. Tugwell	Franklyn D. Roosevelt	Appointed Governor (Democratic)
Col. Miguel A. Muñoz	Dec 1945 – Jan 1958	Jesús Toribio Piñero	Franklyn D. Roosevelt/ Harry S. Truman*/ Dwight Eisenhower	First Puerto Rican governor appointed by Franklyn D. Roosevelt (Liberal party-pro-independence)
Agustin Mercado Reverón	Jul 1958 – Jul 1960	J. Luis A. Muñoz Marín	Dwight Eisenhower	Commonwealth (Autonomist)
Gen. Juan C. Cordero Dávila	Aug 1960 – Jul 1965	J. Luis A. Muñoz Marín	Dwight Eisenhower/ John F. Kennedy/ Lyndon B. Johnson	Commonwealth (Autonomist)
Col. Rafael A. Montilla	Mar 1966 – Jan 1969	Roberto Sánchez Vilella	Lyndon B. Johnson	Commonwealth (Democratic)
Maj. Ramón F. Calderón	Jan 1969 – 1972	Luis A. Ferré Aguayo	Richard Nixon	Pro-Statehood (Republican)

<b>Name</b>	<b>Term of Office</b>	<b>Governor</b>	<b>U.S. President</b>	<b>Party</b>
Edma Santiago de Hernández	Jan 1973 – 1977	Rafael Hernández Colón	Richard Nixon/Gerald Ford	Commonwealth (Democratic)
Ángeles Mendoza Tió	Jan 1977	Carlos A. Romero Barceló	Jimmy Carter	Pro-Statehood (Democratic)
Maj. Juan Enrique López	Aug 1980 – June 1984	Carlos A. Romero Barceló	Jimmy Carter/ Ronald Reagan	Pro-Statehood (Democratic)
Maj. Leopoldo García Viera	June 1984 – June 1985	Carlos A. Romero Barceló	Ronald Reagan	Pro-Statehood (Democratic)
Heriberto Acevedo	Jan 1985 – 1990	Rafael Hernández Colón	Ronald Reagan/ George H. W. Bush	Commonwealth (Democratic)
Col. José A. M. Nolla	June 1991 – 1992	Rafael Hernández Colón	George H. W. Bush	Commonwealth (Democratic)
Epifanio Jimenez Melendez	Jan 1993 – 1999	Pedro J. Roselló González	William J. Clinton	Pro-Statehood (Democratic)
Lic. Miguel A. Santini Padilla	Aug 1999 – 2000	Pedro J. Roselló González	William J. Clinton	Pro-Statehood (Democratic)
Lic. Ileana Rivera Gómez	Jan 2001 – Dec 2001	Sila M. Calderón Serra	George W. Bush	Commonwealth (Democratic)
Rafael L. Guzmán Flores	Dec 2001 – Mar 2004	Sila M. Calderón Serra	George W. Bush	Commonwealth (Democratic)
BG Francisco A. Márquez Haddock	May 2004 – Dec 2004	Sila M. Calderón Serra	George W. Bush	Commonwealth (Democratic)
Nazario Lugo Burgos	Jan 2005 – Dec 2007	Anibal S. Acevedo Vilá	George W. Bush	Commonwealth (Democratic)
Karilyn Bonilla	Dec 2007 – 2008	Anibal S. Acevedo Vilá	George W. Bush	Commonwealth (Democratic)
Heriberto N.	Jan 2009 –	Luis G.	Barack	Pro-Statehood

Saurí, MPF	2012	Fortuño Burset	Obama	(Republican)
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In 1976 governor Rafael Hernández Colón ordered the establishment of Civil Defense offices at the municipal level (Law 22 of June 23, 1976). Expanding the capabilities of the agency also included the establishment of the Puerto Rico Urban Search and Rescue Academy. That same year the government started implementing the use of building and construction permits.

Historically, in Puerto Rico, as in the United States, the Civil Defense had as its main purpose the protection of individuals from nuclear attacks. Because of the reactive focus of the Civil Defense its activities were limited to response and particularly, to search and rescue in the aftermath of an event (Gilbert, 1998). An event that raised the need for a shift in public policy was the Mameyes landslide. In the early morning of October 7, 1985 an avalanche of mud and water, wiped out an impoverished sector of Barrio Cantera in the municipality of Ponce, resulting in over one hundred deaths. One of the first formal initiatives to transform the scope of government policy into one focused on mitigation included signing what is known as Joint Resolution 172 of June 22, 1988. Resolution 172 established a planning program for the mitigation of Natural Risks under the Department of Natural and Environmental Resources.

During the next decade the civil defense continued developing as the government body responsible for the management of natural disasters. In 1997, Law 207 was signed and the planning program for the Mitigation of Natural Risks was transferred to the State Civil Defense Agency. In addition, the 9-1-1 emergency line was established in 1994 as a service separate from the Civil Defense. During the 1990s Puerto Rico also experienced the worst disaster in the island's history. In 1998

Hurricane Georges resulted in over 30,000 houses destroyed, 50,000 houses damaged, and 100% of the energy service interrupted. The agriculture and poultry industry were severely affected. Property damage was estimated at about \$1.7B and crop damage was approximately \$301.1M.

On August 2, 1999, Law 211 transformed the Civil Defense into the Commonwealth of Puerto Rico Emergency Management and Disaster Administration Agency (PREMA). The agency works with all municipalities and other government agencies under the supervision of the central government of the U.S. territory to coordinate all activities and operations related to emergency or disaster situations. The objective of the new agency is to promote mitigation and preparedness before the event to reduce and prevent disasters (Beauchamp, 2002). Before 1999, the Civil Defense of Puerto Rico was focused on providing services after an event. After 1999, the agency promotes preparedness and advocates for the mitigation of risks.

Hurricane Georges was another event that resulted in the creation of a new policy. While the transition into a new organizational scope was already in progress when Hurricane Georges occurred, the Law on Education in Prevention and Emergency Management and Disasters of Puerto Rico (Law 150, August, 10, 2000) was signed in response to Hurricane Georges. The new policy states that Hurricane Georges highlighted the need for preparedness and declared disaster prevention as the public policy for the island. Law 150 provides a legislative vehicle for establishing an educational program on emergency management through the Department of Education. In addition, that same year Governor Pedro Roselló González authorized the disbursement of funds from the Emergency fund to PREMA to organize volunteer groups in each municipality. As the agency and as the policy mechanisms have

continued developing, the organization has assumed a leadership role as the coordinators of emergencies for the State. For instance, in 2003, PR Executive Order 2003-54 designates the 9-1-1 service as part of the executive functions of the Commonwealth of Puerto Rico Emergency Management and Disaster Administration Agency.

The last decade is characterized by an increasing focus on professional emergency management training and on the integration of volunteers. Through the Citizens Corp program emergency response teams have been formed in every municipality. Volunteer civic organizations have been integrated into the 9-1-1 system. Emergency operations plans and annual emergency drills are now mandatory in all government dependencies. Drafting emergency plans is now enforced by the Fire Department as required by the Condominium Law of 1958. In 2005 the incident management computer system was extended to all municipalities and fire department stations. The incident management computer system was already available to other public safety organizations, such as the police. During that decade a standard procedure for processing and monitoring assistance from the Emergency Fund was established. Another important policy of the 2000s decade was the establishment of penalties to citizens that hinder emergency management activities.

Further adaptation of the local system to align the Commonwealth's Emergency Management Agency, with those in other States has increasingly become a requisite to be eligible for federal programs. In 2011 a "Fusion Center" was established in Puerto Rico to facilitate the exchange of information between local and federal authorities. Fusion Centers are an initiative of the 2004 Intelligence Reform and Terrorism Prevention Act. By any standard, much has been accomplished.

Emergency management is increasingly becoming an important component of government operations. The creation of emergency management policies has translated into tangible actions to ensure emergency preparedness. Chapter 6 presents the findings of interviews with emergency management in Puerto Rico on matters related to the practice of emergency management, specifically I examine to what extent the Puerto Rico Emergency management organization is recognizable according to Weber's approach to decision-making, external politics, assumptions regarding State practices, and service effectiveness. I also examine how the current governance and organizational structures shape emergency management services and preparedness efforts. In the next chapter I present the methods employed for this research project.

## **Chapter 3**

### **METHODOLOGY**

#### **3.1 Background**

My opportunity to study the emergency management bureaucracy emerged as part of the efforts of the Center for Collaborative Adaptive Sensing of the Atmosphere (CASA) to understand end-users of weather radar technology (McLaughlin, et al., 2005). The CASA project had two “proof of concept” test beds: one in Oklahoma and one in Puerto Rico. The Puerto Rico Student Led test bed (SLT) was a multi-level, multi-institution, multi-disciplinary education project led by students at different CASA partner institutions. The goal of the project was for students to design and build distributed collaborative adaptive sensing (DCAS) radars useful in variable terrain. Engineering students in Puerto Rico worked on 30km radar and other smaller low power radars to be networked in order to provide accurate quantitative precipitation estimates (QPE). Students were also working in distributed flood models, in the calibration of rain gages, and in a variety of other research projects. As a social scientist, my main focus was to understand how the emergency management agency functioned in Puerto Rico, how technology was utilized, what were the perceived advantages, disadvantages and limitations of the technology they currently used, what were the primary sources of weather information, how information flowed from the moment that an event is noticed by forecasters to the dissemination of the information by the NWS warning meteorologist and emergency managers to the public, what were the perceived hazards, what were the perceived risks, what citizen programs were in

place, and what factors, in terms of resources, training, information and technology needed to be taken into account to enhance and contribute to decision making, preparedness, and response.

This project did not start as an attempt to apply or test a particular organizational theory. Initially this project was guided by specific interests and then was extended beyond its original scope because of my personal academic interest on social vulnerability to disasters in Puerto Rico. Interviews with emergency managers and other radar technology end users sought to understand how the emergency management organization functions, how weather data is used, and how emergency management is practiced. The idea was to understand how weather related emergencies were managed in Puerto Rico. In Chapter 6 I use data collected through interviews with emergency managers to discuss the extent to which the Puerto Rico Emergency Management Agency is recognizable using Weber's conceptualization of the ideal type of bureaucracy on matters related to decision-making, hiring, external politics, assumptions regarding State practices, and service effectiveness. In Chapter 7 I used data collected through archival research and interactive interviews for a case study of the evolution of risks, emergency management, and social vulnerability in the municipality of Cataño to examine how macro-level decisions impinge upon micro-level dynamics. In this chapter I present how this research project evolved and the methods employed.

### **3.2 Research Scope and Questions**

Because of my interest and previous work on social vulnerability to disasters in Puerto Rico, and on disasters as social processes linked to development, I sought to:

- Develop a better understanding of emergency management in the island

- Understand the history of the organization, its functions, and structure
- Characterize the roles of emergency managers on an everyday basis and during emergency situations
- Understand how technology is utilized, what are the perceived advantages, disadvantages, and limitations of the technology they currently use
- Identify what are the primary sources of weather information used by emergency managers
- Identify what are the perceived hazards
- Lastly, I sought to understand how different players, such as FEMA, the local emergency management agency, policy makers, the National Weather Service, other government agencies, the media, relief organizations, non-governmental and community organizations, and the general public intersect in the prevention and management of disasters.

To guide my research I used the following research questions,

- How the historical origins of the agency have evolved over time?
- What are the legal mechanisms supporting emergency management in Puerto Rico and how they emerged?
- What is the structure of the emergency management organization in Puerto Rico? (i.e. the extent to which the organization is recognizable using Weber's approach on matters related to decision-making, hiring, external politics, assumptions regarding State practices, and service effectiveness)
- How does the current governance and organizational structures shape emergency management services and preparedness efforts?
  - o How are these services delivered?

- o In what context are these services received?

### 3.3 Field Research

During the four years that I worked on this project, I visited the field on twelve separate occasions. Table 3.1 lists each visit and the reason for each visit.

Table 3.1: Field Research

Field Visit	Tasks completed
Visit # 1 Summer 2007	Direct observation of coastal communities with low socio-economic status according to data from the 2000 U.S. Census and identified through the effort of another project focused on mapping social vulnerability indicators in Puerto Rico. Informal conversations with residents about hazards in their community took place.
Visit # 2 January 2008	In-depth interviews with emergency managers.
Visit # 3 April 2008	In-depth interviews with emergency managers.
Visit # 4 November 2008	In-depth interviews with emergency managers.
Visit # 8: January 2010	First visit to Cataño following the explosion at a fuel storage facility in October 2009.
Visit # 9: August 2010	Archive research. Official documents collected from the emergency management agency. A total of two formal interviews were completed.
Visit #10: December 2011	Archive research at University of Puerto Rico-Rio Piedras
Visit #11: March 2012	Archive Research at University of Puerto Rico Planning School, Field Work in Cataño, Direct Observation During LANTEX 2012 Exercise
Visit #12: May 2012	Field Work in Cataño.

During those visits, fifteen formal and nineteen interactive interviews were conducted. Participants were selected using a combination of purposive and

availability sampling methods. These selection methods are non-probability sampling methods. The sample was selected using purposive and availability sampling methods to assure that the sample included informants from different levels and groups involved in emergency management. Formal interview participants included six emergency managers at the local level, two emergency managers at the regional level, four emergency management personnel at the state level, two NWS personnel, and one community leader (see Table 3.2).

Table 3.2: Study Participants

<b>Participants</b>	<b>Number</b>
Local Emergency Managers	6 Formal Interviews, 1 Interactive Interviews
Regional Emergency Managers	2 Formal Interviews
State Emergency Management Personnel	4 Formal Interviews
National Weather Service	2 Formal Interviews
Community leaders	4 Interactive, 1 Formal
Community residents	13 Interactive Interviews
Media	2 Interactive Interviews
Municipal Employees	3 Interactive Interviews
<b>Total</b>	<b>38 Interviews</b>

Formal interviews were carried out using an open-ended interview guide, found in Appendix A. Interviews were conducted at the participant's workplace. Interactive interviews with community residents were conducted outside of their homes. The interview guide was used in a flexible way and mostly to assure that all areas of interest were covered. The guide is divided into nine sections: an initial section focused on weather information sources, a second section focused on weather information and decision-making, a third section focused on perceptions, accuracy, and reliability of weather information, a fourth section on communication with the

public and other organizations, a fifth section on mass media and risk communication, a sixth section on challenges in the dissemination of warning information, a seventh section on characteristics and needs of the potential new users of CASA technology, an eighth section focused on public policy issues, and a last section that allows the interviewee to incorporate any additional thoughts, issues or ideas that he/she considers important or relevant to the implementation and use of new technology.

Formal interviews were recorded, transcribed and analyzed. Notes taken during those interviews were also analyzed. Note-taking was particularly important for interactive interviews because they were the only way to accumulate data for later analysis. Therefore, notes were taken while on the field and a summary was prepared at the end of every day.

### **3.4 Case Study of the Municipality of Cataño**

As I was doing interviews with emergency managers and weather information decision-makers, an explosion occurred at the Caribbean Petroleum Corporation (CAPECO) in the main fuel storage facility in the northern metropolitan area of San Juan. The event provided an opportunity to study the linkages between emergency management and social vulnerability.. Chapter 7 presents a case study of the municipality of Cataño, where CAPECO is located. Cataño is particularly interesting because it is also the municipality where the industrialization process of Puerto Rico began in the 1940s. As I will discuss, the communities surrounding the fuel storage facility are predominantly low-income marginalized communities. Originally these communities were squatter settlements. As time has passed these communities have formalized and are exposed to excessive environmental pollution. The municipality of Cataño is a non-compliance area according to the Environmental Protection Agency

(EPA) because of its poor air quality. It is the site of historical environmental justice struggles.

### **3.5 Formal and Interactive Interviews in Cataño**

Gaining access to the communities surrounding the storage facility in Cataño required a different approach from that used for the interviews with government personnel. The interviews with emergency managers and weather related personnel were coordinated mostly through phone calls and interviews were semi-structured. As I was doing the interviews, I would go back and forth through the interview guide to make sure that all themes were covered. Those interviews took place in formal settings, such as offices or meeting rooms. The interviews in Cataño were interactive informal interviews.

Ellis and Berger (2003) describe the interactive interview as a collaborative process. I grew up in Puerto Rico and that was instrumental in establishing contacts. I obtained initial access to the communities surrounding the fuel storage facility through a friend colleague who was studying the epidemiology of respiratory and skin diseases in one of the communities. He provided me with the contact information for the director of a local community organization and that led to my first field visit to Cataño. I was able to make additional contacts through the Dominican Sisters of Amityville. As a child I attended a catholic school in Puerto Rico that is managed by Dominican sisters. Their congregation also has a ministry in the municipality of Cataño. They learned about my work in Cataño and offered to help me establish some initial contacts with other communities.

In contrast to the interviews with emergency managers, the interviews in Cataño were informal and interactive. Corbin and Morse (2003) contend that each

interactive interview has a new “agenda”. For me as a researcher, organizational theory, particularly the emphasis on cultural adaptation, is used as a theoretical theme to guide the research because it makes sense in the context of Puerto Rico’s history. In the field, however, I was a “student” trying to learn about what happened in Cataño during the explosion, what else affected local communities, and their relationship with emergency management and other government agencies. I decided to not collect any identifying information or record the interviews because the topic is sensitive and I wanted to be able to gain as much information as possible. Instead, I took extensive notes during and after each interview. Participants were selected using snow-ball sampling. Once I identified a key informant, I reached out to them and asked if they were interested in sharing their experience during and after the explosion. For the most part, everyone contacted was very eager to talk about their experience. I would then schedule a time and place to meet with the participant and we would discuss the event of the explosion, other environmental problems that were of concern to them, and their relationships with emergency management and other government organizations. Some interviews took place in offices, others in porches, others in the bay area, and some even included a visit to local chinchorro, which are small kiosks that sell fish, octopus salad, fried turnovers and other local foods. At the same time, some of those communities are controlled or intimidated by drug gangs. These underground organizations often expect to know activities taking place in the community or seek to identify visitors. At least, two participants of the study mentioned being asked by people who watch over strangers who I was and what was I doing in the area. In one of the communities, I was directly asked by a person about my work in the community and whether I was involved with law enforcement agencies. During that encounter I

explained to that person that I was a sociology student studying the response to the CAPECO explosion, that I was not involved with the police or any law enforcement agency, that I would never identify anyone, and that I was the only person working in the project. That encounter reminded me of the value and importance of remaining as a “student” while I was in the community. Being a “student” was less intimidating to my participants. A few participants mentioned that they sometimes feel that when scientists come to their communities they often come to get their data and not to help the community. From a methodological standpoint, those remarks highlight the importance for researchers to clearly explain to study participants the scope of our research, how it connects to larger social issues, and making sure that they receive a report of the findings of that study. If possible, we should try to personally deliver that report to community leaders and thank them for what was learned through the experience of working in that community. At the very least, we should always make sure that participants know about the findings of the study after it is completed.

How I portrayed myself and will do so in the future is very important to students working in marginalized communities. During the encounter with the person who asked me what I was doing in the community and if I was involved with law enforcement I not only needed to follow all the methodological guidelines; I also needed to conduct myself in a way that was respectful. The situation also required me to speak informally about my work to a person that is not familiar with the concepts that I seek to understand using a language that portrayed me as familiar, approachable, and trustworthy. I acknowledged the role of the person and using simple language I assured him in a confident and familiar way that I was not there to “investigate them” or “to get anyone in trouble with the police”. During that situation it was not just

important that I spoke Spanish but that I was familiar with the culture of the island, the local jargon, and was able to conduct myself as a “local” even though I was raised in a different municipality and never lived in a marginal community (see also Bernard, 1998).

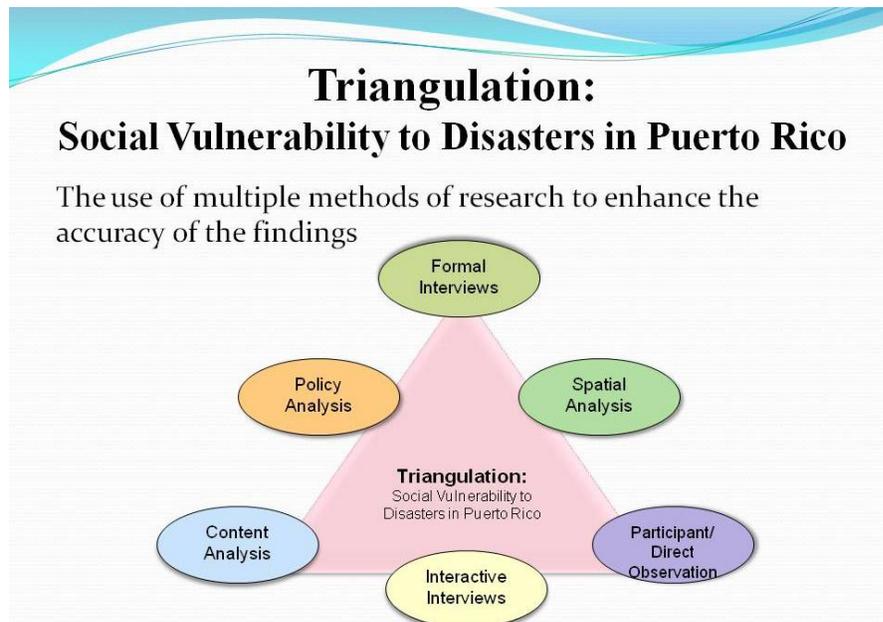
### **3.6 Strengths and Challenges of a Qualitative Approach**

Qualitative methods as used in the social sciences allow us to study the complex dimensions and layers of the social world. In contrast with quantitative research, fundamentally concern with objectivity, qualitative research is more concerned with the critical interpretation of the phenomena at hand. In this sense, the researcher is also a valuable research instrument because his or her observations assist in understanding the social world (Leedy and Ormrod, 2005:133). There are at least six common qualitative research designs: case studies, ethnography, phenomenological studies, grounded theory studies, narrative analysis, and content analysis. This dissertation presents a case study of emergency management in Puerto Rico.

Qualitative researchers often use several ways of collecting data to assure validity and triangulate their findings. Triangulation can be defined as “a validity procedure where researchers look for convergence among multiple and different sources of information to form themes or categories in a study” (Creswell and Miller, 2000). Using the methods that I describe in this chapter allowed me to integrate multiple perspectives and to triangulate my findings. The process of triangulation allows the researcher to check the findings revealed by the data collected. For the purpose of this dissertation I build on data about the practice of emergency

management collected through direct observation, interactive interviews, in-depth interviews and official and non-official documents.

Figure 3.1: Triangulation Diagram



### 3.7 Archival and Online Research

Through field work and document retrieval, a wealth of data was accumulated. To better understand the contemporary emergency management, I documented the history of the organization. There is no official comprehensive history of the Puerto Rico emergency management organization. In order to reconstruct the organization's history a number of historical documents and audiovisual resources were collected from the Puerto Rico Emergency Management Agency (PREMA), the Puerto Rico Historian Office, the Puerto Rico Legislative Archives, and the U.S. National Archives. PREMA's public documents office provided a list of executive directors,

budgets, event reports, and a short documentary film on the organization. The Historical Archive of Puerto Rico and the Puerto Rico Legislative Archive provided a series of policy documents related to emergency management. Policy documents to trace the evolution of emergency management in the United States were retrieved from National Archives online. A list of emergency management offices with addresses, phone numbers, directors, and political party in power in the municipality was generated. The list was updated after the 2008 elections to track changes in political administration and personnel. Appendix C presents several tables that outline the progression of emergency management policies and administration in Puerto Rico and the United States.

### **3.8 Analysis of Formal Interviews**

There are several ways of analyzing qualitative data; including the development of typologies, taxonomies, analytic induction, matrix analysis, quasi-statistics, metaphorical analysis, discourse analysis, and semiotic analysis, among others. This dissertation employs two analysis techniques. First, the constant comparison method is used in earlier stages of the analysis to develop categories, generate codes, exploring consistencies between codes, identify and create emerging categories, and to finally further explore certain categories in more depth. Secondly, metaphorical analysis is also employed to make sense of the findings and to understand the implication of the study for organizational theory. In addition to the initial themes that were of interest to CASA, I collected data on other themes that were related to my interest and research questions. I was able to do this because I participated in the CASA project for an extended period of time, and because I extended that initial research to gain a broader perspective of social vulnerability

issues in the island. As I identified new themes emerging in the interviews I followed up on them. Therefore, the analysis of the data collected was an active process and not something done after the data was collected. In qualitative research that approach is defined as the Constant Comparison Method.

The Constant Comparison Method (CCM) is one of the oldest and main analysis techniques in qualitative research and the main one used for this dissertation. Developed in the 1960s by Anselm Strauss and Barney Glaser, the constant comparison method was developed to collect and analyze data on sensitive social problems. The constant comparison method as described by Glaser (1965:436) “allow the researcher either to gain the trust of the people in the situation or, if necessary, to accomplish clandestine research.” The constant comparison is particularly useful to systematically generate theoretical ideas because the researcher is constantly examining the data collected and comparing it with the data already collected. This practice allows the researcher to explore emergent themes.

Data analysis with the constant comparison method starts with a set of field notes or transcripts in which a set of behaviors or patterns are identified. This initial process is often referred to as open coding. From there, the codes identified in the first transcripts and field notes are compared with the next set of transcripts and field notes to identify consistencies and differences. Codes that are consistent, in terms of similar ideas and meanings, become categories for axial coding. The differences identified become memos that are later explored to determine whether they become patterns that are then turned into categories. As categories saturate they become central categories or axial categories. Axial coding allow the researcher to determine the conditions that lead to a pattern, the context in which the pattern take place, the mechanisms used by

people to cope or manage the category, and ultimately the consequences of those management strategies . Once saturation point is reached, the theory can be delimited and subsequently written to form a ‘story’ that captures the complexity of the studied phenomenon. Therefore, the theory is derived from the data collected.

From the categories that were generated while analyzing the initial interviews, a number of additional broad questions emerged. The questions were kept broad to collect as much information as possible and to approach the participant as a repository of important insights on organizational dynamics and of matters related to the implementation disaster and emergency management policies. The themes and subcategories that emerged from the analysis of the interviews with emergency managers were the following:

Theme: Service years and experience -

- How long have you served as an emergency manager?
  - Categories:
    - Through the current political administration
    - More than four years, through a change in the local political administration
    - More than four years, without a change in the local political administration

Theme: Political Shifts -

- Have you experienced any difficulty as a result of the political changes that have taken place in the last years?
  - Categories:
    - No difficulties

- Increased participation in official events not related to emergency management
- Lost job
- What have been some of the changes, if any, resulting from the change in the political party currently holding office?
  - Categories:
    - New to the office
    - Changes in the number of employees
    - Evaluation of prior emergency management activities and plans
    - Training new or old employees
    - No changes

Theme: Standardization of Emergency Management Activities -

- On a daily basis, what are your tasks as emergency managers?
  - Categories:
    - Acquisition of formal emergency management training
    - Local mitigation in coordination with other organizations
    - Mitigation activities with emergency management funds and resources
      - Sub code:
        - Local funds
        - Regional funds
        - State funds

- Federal funds

Theme: Policy Implementation -

- What mitigations programs are being implemented? What is the source of funding for those programs? What hazard threats are addressed by those programs?
  - Categories
    - CERT
    - Another Citizens' Corp program
    - Search and Rescue Team
    - Volunteers team
    - School outreach program

Theme: Changes in Personnel (Organizational Learning) -

- If the person was no longer an emergency manager, what is your current position or what kind work you are currently engaged in?
  - Related to emergency management
  - Not related to emergency management
    - Follow-up information?: If the person was no longer an emergency manager, how was it replaced?
      - Replaced after change in political administration
      - Moved to another government unit
      - Moved within the agency
      - Moved to the private sector
      - Transition
      - Continuity concern

- Knowledge transfer concern

### **3.9 Analysis of Political Shifts and Emergency Management**

One of the themes that emerged during the interviews with emergency managers was that of the effects of political shifts on emergency management. Interview participants claimed that changes in the political party controlling a jurisdiction often translates into a change in the emergency management director. This is because the emergency management director position is considered a political appointment.

To examine the effect of changes in political administration on emergency management appointments a database containing all directors was built. An initial database containing a list of emergency management directors was created in 2007 by calling each emergency management office in the island and requesting contact information. That first list was assembled to distribute user manuals for a geo-referenced mapping tool created to distribute the social vulnerability index and other data obtained and generated as part of a previous project. The contact list assembled in 2007 was employed as a baseline to contact each municipal emergency management office following the 2008 election to inquire about any directorship change. New emergency managers were added to the list. After adding new emergency managers, election results were obtained from the State Elections Commission (Comisión Estatal de Elecciones) and added to the database to identify municipalities in which the political administration changed.

### **3.10 Conclusion: Multiple Methods of Research**

Multiple methods of research enhance the accuracy of research findings (Jacobs, 2005). Triangulation or the combination of multiple methods can be used to explore a research question using diverse data sources and analysis techniques. Therefore, it provides us with a more comprehensive approach to a research question. Through this research, I employed different methods to analyze the evolution of the organizational features and practice of emergency management in Puerto Rico in a way that would allow me to integrate multiple perspectives about issues of emergency management and social vulnerability to disasters in Puerto Rico. While the sample size and the process of selection of participants do not allow me to generalize, the data collected provides very valuable insights that would otherwise be unknown to many audiences. I used different methods to examine how issues of social vulnerability impinge upon emergency management in Puerto Rico. The discussions and findings presented in the following chapters frame emergency management as an evolving living system with multiple actors making rational decisions within a neo-colonial social context. The next chapter provides an overview of Puerto Rico's development that stresses the paternalistic relationship of the island's government with the United States. Later on, in Chapter 6, I discuss how emergency management in Puerto Rico has been influenced by U.S. policies in more detailed and I explore what have been some of the advantages and disadvantages of that relationship for emergency management.

## **Chapter 4**

### **LOCATING SOCIAL VULNERABILITY TO DISASTERS: PUERTO RICO AS THE CASE STUDY SITE**

In the book *Disasters by Design: A reassessment of Natural Hazards in the United States*, Dennis Miletti (1999:135) presents a short description of an ideal society in which individuals, communities, businesses, and organizations are self-reliant because of their decisions to increase mitigation and preparedness. In reality, disaster mitigation and preparedness measures are often replaced by more impending needs and concerns (López-Marrero and Yarnal, 2010).

Bumgarner (2008) discusses how as societies have advanced, the State has assumed the responsibility of protecting its citizens. While governments have assumed the role of protecting its citizens from disasters, rarely disaster policies are a priority in their agenda (Sylves, 2008). Disasters have low political salience unless an incident has recently occurred (May, 1985). For example, a current discussion in the U.S. emergency management community is whether, and to what extent, the recent Hurricane Sandy affected the 2012 U.S. election results. As it is the case in other places, in Puerto Rico disaster policies have been reactive to disasters (Molineli-Freytes, 1991). More importantly, as is also the case in other places, in Puerto Rico disaster policies often favor the adoption of specialized technology, structural mitigation initiatives, and short-term assistance; overlooking larger social needs that can foment local capacities through empowering strategies, such as community training and organizing.

To attend the need for assuring the survival of society, the government has distributed the responsibility of disaster reduction to agencies. Policies have been established to manage risks and to reduce the effects of disasters. In doing so, a bureaucracy is created, something which is very important but perhaps not fully appreciated in disaster studies.

Puerto Rico offered me an opportunity to study the emergency management organization, the policies in place, how those services are delivered, and how the broader relationship of the island with the United States mediates how this organization operates, adapts, and ultimately how it manages emergencies and disasters. Therefore, in terms of contributions to the current understanding of organizations, this dissertation contributes to the current literature on organizational change; more specifically I consider how organizations adapt to an imperialist power that establishes its hegemonic dominium over a state, in this case between the United States and the unincorporated territory of Puerto Rico. As argued by Briggs (2002:194), when studying many of the processes studied under the rubric of globalization, such as the feminization of the assembly line, the racialization of immigrant labor forces, anti-poverty and welfare policies, and the U.S. rhetoric of “benevolent” overseas interventions, among others, is inevitable to think about Puerto Rico. This chapter introduces the reader to Puerto Rico and outlines the social, political, economic, and cultural transformations in the island. My goal was to provide the reader with a better understanding of the environment that impinges upon emergency management and social vulnerability to disasters in Puerto Rico.

#### **4.1 Puerto Rico's Geographic Location and Natural Hazards**

Puerto Rico, the smallest of the Greater Caribbean Antilles, is located east of the island of La Española. Puerto Rico has an approximate land area of 8,900 square kilometers. The northern part of the island faces the Atlantic Ocean and the southern part faces the Caribbean Sea. Because of its geographic location and physical characteristics numerous natural hazards, such as tropical storms, hurricanes, heavy rainfall, storm surges, earthquakes, tsunamis, and landslides, are high probability events.

The island is located south of the intersection between the North American and the Caribbean plate, at about 40 kilometers from the subduction zone of these two plates known as the Puerto Rico trench. Consequently, Puerto Rico is in one of the most active seismic regions of the world with faults north and south of the island. At least twenty-five earthquakes in the last century have originated in the seismic zone in the southwestern part of Puerto Rico. In addition to earthquakes and tsunamis, seismic activity could also generate landslides in land or underwater, particularly in the area of the Puerto Rico trench (Huérffano, von Hildebrandt-Andrade, and Báez-Sánchez, 2005).

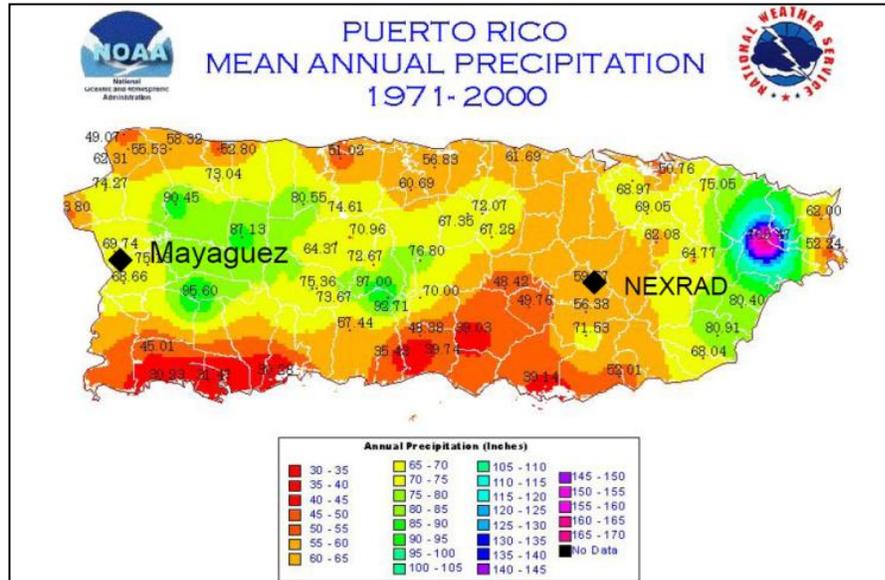
Puerto Rico's climatology follows the patterns found in the tropical region and doesn't experience the marked seasonal differences that are observed in other zones. Puerto Rico has two distinct seasons, the rainy and the dry season. The dry season lasts from December to March and the rainy season lasts from May to November. However, precipitation averages vary across Puerto Rico, mainly due because of its topography (Picó, 1969). The island's topography is divided into three geomorphologic provinces: the Central-Interior Mountain Range, the Northern Karts, and the Coastal Plains. According to the National Oceanic and Atmospheric (NOAA)

and the National Weather Service (NWS), annual precipitation totals in Puerto Rico range from 30 inches in the southwestern coastal plains, to over 100 inches in the Interior mountain range (see Figure 4.1). In addition, Puerto Rico's mountain ranges create an orographic lift that makes the ascending air cooler in elevated areas; it produces more rainfall in some areas.

The patterns of Puerto Rico's rainfall combined with the topography and the urbanization patterns that have transformed the landforms make the island susceptible to flash floods and mudslides (Grau et al., 2003). On a daily basis smaller and more localized events like copious rainfall result in smaller crisis events affecting neighborhoods and communities throughout the island. Urban floods are described by state officials as an "every afternoon issue". The primary roads and highways in Puerto Rico often have drainage problems. As one participant of the study states:

"In the main roads of Puerto Rico, "la Piñero", "la Kennedy", with any sign of rain, even if is not too significant, it floods... that is the day to day situation. It happens every other afternoon when it rains for two or three hours."

Figure 4.1: Mean Annual Precipitation Estimates (National Weather Service, San Juan Forecasting Office)



Hazards such as the ones discussed earlier often result in disasters in the context of Puerto Rico (see Table 4.1). A hazard is an extreme event in the environment. Mileti (1999) defines a hazard as an “extreme, low probability meteorological or geological phenomena that have the potential to cause disasters when they strike human collectivities (Mileti, 1999:22)”. In contrast a disaster can be defined as “processes involving the combination of a potentially destructive agent from the natural, modified, and/or constructed environment and a population in a socially and economically produced condition of vulnerability, resulting in a perceived disruption of the customary relative satisfaction of individual and social needs for physical survival, social order and meaning (Oliver-Smith, 1998). Since 1956 Puerto Rico has received about 25 federal declarations of major disasters and four federal emergency declarations (FEMA, 2006). The worst disaster in the island’s recent

history was Hurricane Georges. According to the National Climatic Data Center, the damages in Puerto Rico, as a consequence of Georges, exceeded two billion dollars. More recently, on September 21, 2008, tropical storm Kyle affected the southern coast of Puerto Rico. The event lasted 24 hours, generating approximately 30 inches of rainfall, which resulted in rivers overflowing, landslides and extensive structural damage in the southern region. It was a 200-year event according to the National Weather Service (Austin, 2008). A 200-year flood event is one that has a magnitude that on average occurs every 200 years. The disruption experienced in the aftermath of these hazard events illustrates the vulnerability of the Puerto Rican population to disasters.

Table 4.1: Major Hazards Events in Puerto Rico’s History

<b>Earthquakes</b>	
1520s	Earthquake that destroyed Juan Ponce de León house
1717	Earthquake results in extensive damage in the municipality of Arecibo
1787	Earthquake causes severe damage to the San Felipe and San Cristobal forts
1867	Earthquake in Anegada passage results in damage to Eastern Puerto Rico
1918	Earthquake and tsunami struck the Western region
May 16, 2010	5.8M earthquake with epicenter in the municipality of Moca

Hurricanes	
August 16-17, 1893	Hurricane San Roque results in 4 deaths and extensive damage to the coffee industry
August 8, 1899	Hurricane San Ciriaco results in 3,369 deaths
September 10, 1931	Hurricane San Nicolás results in 2 deaths and severe damage to agriculture
September 26, 1932	Hurricane San Ciprián results in approximately thirty millions dollars in losses, 25,000 families are left without a home, and 225 deaths were reported
August 12, 1956	Hurricane Betsy (Santa Clara) results in \$40M in losses, 15,000 houses destroyed and 16 deaths
August 29, 1979	Hurricane David results in \$125M in losses and 1,200 deaths
September 4 1979	Hurricane Federico
September 18,1989	Hurricane Hugo - strongest winds were felt in the Eastern part of the island. Five deaths and \$1B in damages.
September 15, 1995	Hurricane Marilyn – A Category 2 hurricane that although never made landfall in the island resulted in severe storm surge, 2 deaths, 8 injured, \$1.2M in housing damages, and \$9M in damages to public facilities.
September 10, 1996	Hurricane Hortense – 22 people died, extensive flooding, disruption of utilities and other services
September 22, 1998	Hurricane Georges – the worst disaster in the island’s recent history. Over 30,000 houses were shattered, about 50,000 had major or minor damage, and 100% of the power service was interrupted. The agriculture and poultry industry were severely affected. Property damage was estimated at about \$1.7B and crop damage was approximately \$301.1M.
November 17, 1999	Hurricane Lenny – although the hurricane did not make landfall in the island, there was extensive flooding associated with rain bands. Some sectors received over seven inches of rain in 48 hours causing landslides in the mountainous region. Heavy rains resulted in about \$13M in crop damage.

August 30, 2010	Hurricane Earl – The center of the Category 4 hurricane passed over a hundred miles away from San Juan but there was extensive flooding associated to rain bands. The heavy rain resulted in landslides in the mountainous region, and millions of customers were without electricity and water services for over a week. In the morning of the event heavy traffic was reported because schools and government agencies were ordered to open until noon the day of the hurricane. The islands of Vieques, Culebra, and municipalities in the eastern part of the island experience the most severe damages.
<b>Landslides</b>	
October 1985	Mameyes landslide - Approximately 100 hundred deaths in the municipality of Ponce.
<b>Flooding</b>	
October 5-10, 1970	Tropical Depression – 42 inches of rain in 5 days resulted in 60 municipalities declared disaster areas by the U.S. president. There were 18 deaths and \$65M in damages.
September 1975	Tropical Storm Eloise resulted in heavy rainfall and landslides. Approximately 34 people died and damages were estimated at around \$125M.
October 4-7, 1985	Tropical Storm – 24 inches of rain in 24 hours resulted in extensive flooding. The U.S. government assigned \$65M in federal assistance to those affected by this event.
January 5-6, 1992	Three Kings Day Flooding Event – flash floods resulted in about 23 deaths and over \$50M in property damage.

To compound matters, beyond the hazardousness of the place is the interaction of the island’s residents with them. López Marrero and Yarnal (2010) examined the flood risk perception of two communities at risk to flooding in east Puerto Rico and found that residents were more concerned about other everyday risks. The adaptation of residents in the two communities studied was informed by their economic situation. Other concerns such as the lack of employment, family problems and health, were ranked as more important by the residents of the two communities studied. While the findings of their study are limited to those two communities, it sheds light into broader

issues of culture that should be further explored and taken into account when designing preparedness and mitigation initiatives. The findings of López-Marrero and Yarnal support the existing literature that states that the perception of risks by people is the product of the social context where risks are understood and negotiated (Douglas, 1992). Therefore, the island is not only susceptible to numerous hazard events. In the context of Puerto Rico there are larger problems that inform how hazards are perceived, how they are managed, and ultimately create its social vulnerability to disasters. Furthermore, these findings are not unique to the context of Puerto Rico, Turner, Nigg, and their colleagues (1980) also found similar patterns in their study of communities in Southern California.

#### **4.2 Puerto Rico in the World System**

The territorial expansion of the United States in the 19th century was at the heart of the consolidation of the North American State and its model of capitalism (Ayala and Bernabe, 2007). Since General Nelson A. Miles arrived in Puerto Rico with U.S. troops in 1898, a political and economic relationship with the United States has been maintained. Puerto Rico had been severely affected by the ban on imports and exports imposed by the United States on Cuba and Puerto Rico in the midst of the Spanish American War. The military conflict between Spain and the United States in Puerto Rico lasted about three weeks and towns that were not satisfied with the relationship with Spain gave little resistance to U.S. troops. Spain rapidly ceded the war to the United States.

From very early on, the U.S. played a very important role in the formation of Puerto Rico's political system, culture and institutions. Puerto Rico was occupied by U.S. military troops on July 25, 1898. For the first two years a military government

controlled Puerto Rico. Cabán (2002:172) argues that under U.S. supervision “the state of Puerto Rico has evolved into a sprawling bureaucracy with substantial resources”. Upon arrival, Americans reorganized the Puerto Rican society so that it could be integrated into the larger metropolitan trade system (Dietz, 1986; Scarano, 2000). The island was to be turned into a prototypical monoculture export model to control the international sugar market. The transformation was not limited to the economy; all other aspects of social life were transformed and ruled by the United States (Castro-Arroyo and Luque de Sánchez, 2001).

From the beginning, the relationship between Puerto Rico and the United States was plagued with ethnocentrism. Assumptions of American racial and cultural supremacy over Puerto Ricans were unequivocally present in the report of the island situation made by the US government appointed commission in 1899 (Barreto, 2002). Despite this racial subjugation, in Puerto Rico racial inequality is often overlooked and African heritage is suppressed (Jiménez Muñoz, 1995, 2003). Jimenez Muñoz (2003) contends that evidence of this is the fact that even though the majority of the population is racially mixed, we describe ourselves as White. In 1950, when the U.S. Census had a race question for the last time before 2000, 80 percent of the population described themselves as White. Interestingly, fifty years later, also 80 percent of the population self-identified as White (U.S. Census of Population and Housing, 2000). The constant suppression and denial of Puerto Rican blackness could be evidence of the tension generated by a history of racial and cultural oppression (see Jimenez, 1995).

The belief that Puerto Ricans were unable to govern themselves was an extension of the racial and cultural supremacy assumed by the United States. Such

beliefs were so strong that through the Foraker Act, also known as the Organic Act of 1900, U.S. Congress instituted in the island a government that was only partially civilian and self-established. During the political transition to become a U.S. possession, leading officials were named by President McKinley. Moreover, the justification offered in numerous reports generated by Presidential commissions was that of "teaching Puerto Ricans how to "self-govern" (Wilson, 1977).

In 1917, in the midst of the World War I, the Jones-Shafroth Act established Puerto Rico as an "organized but unincorporated" territory and granted U.S. citizenship to the island's population. The Jones-Shafroth Act allowed the conscription of Puerto Rican men to the U.S. Army during war time. The Jones-Shafroth act also placed protectionist restrictions on trade; requiring that all goods imported and exported to Puerto Rico are transported using U.S. ships. The idea behind the protectionist merchant marine laws outlined by the Jones Act were to secure a merchant fleet that could be used during wartime. However, the U.S. share of merchant shipments is really small, expensive, and currently affects the island's competitiveness when compared to Mexico and Canada, members of the North American Free Trade Agreement (Gutierrez, 2012).

The Jones-Shafroth Act was not able to significantly improve the economic situation in the island. The worldwide economic downturn of the 1930s severely affected Puerto Rico. James Dietz (1986), in his analysis of the crisis of the 1930s, claims that this decade was characterized by a loss of control of the United States over Puerto Rico. The loss of control translated into an increase in the local nationalist sentiment. He points out several reasons for the increased nationalist sentiment including the collapse of the monoculture export model, the struggles of the working

class against work conditions and extremely low salaries, and the emergence of the Nationalist Party as a strong militant force against U.S. imperialism. Economic collapse made a significant sector of the population question the legitimacy of U.S. colonial power. Dietz (1986) argues that the loss of control became a major concern for the U.S. and for the appointed governor, Rexford G. Tugwell, leading to significant changes in the political relationship between Puerto Rico and the U.S. and pointing to the urgent need for social and economic reform.

### **4.3 Impact of the New Deal in Puerto Rico**

The social reforms implemented in the island rapidly transformed the Puerto Rican society. At the same time with these reforms came new risks, changes in infrastructure, a redistribution of the population into new urban areas, among many other processes relevant to understanding disasters. Socio-economic reforms not only promoted economic growth but also created an ample working class and provided choices to facilitate mobility and the accumulation of wealth by members of a society that until that point had been excluded. These social reforms are also important because they became part of the economic model showcased and later implemented in other countries in the Caribbean and throughout Latin America (Castro and Luque, 2001).

Concerns regarding the need for developing the island's economy increasingly translated into policy after the 1930s. For instance, in that decade the resident commissioner for Puerto Rico, Santiago Iglesias, was able to obtain a very small allocation of federal funds, for the Puerto Rican Emergency Relief Administration (PRERA). In addition, the first of a series of proposals to improve and restructure the economy of Puerto Rico emerged under the umbrella of the Chardón Plan (El Plan

Chardón). The government proposed to buy the most productive land and to redistribute it among the population. The main goal of the Chardón Plan was to give peasants access to fertile land to encourage agriculture and promote the development of an independent economy (Scarano, 1993). Government efforts sought to restore the production of sugar; a very profitable sector for foreign investors in the 1920s. The major difference is that this time the profit would also benefit local farmers. Nevertheless, in 1934 the Jones-Costigan Amendment was adopted, and sugar production quotas were imposed (see Castro & Luque, 2001). As a result of these new quotas sugar production became unprofitable and the Chardon Plan was abandoned.

In 1942 governor Rexford G. Tugwell, concerned about the continued growth of the pro-independence movement and the stagnation of the island's economy, established the Puerto Rican Development Corporation. In 1947 the "Operation Bootstrap" program (Operación Manos a la Obra) was launched. The goal of Operation Bootstrap was to invigorate Puerto Rico's economy by 1) attracting U.S. investment to facilitate the emergence of an industrial sector, 2) reducing fertility, and 3) promoting emigration to stimulate economic growth. The program included tax and tariff exemptions for U.S. corporations operating in the island, cheap labor, low cost infrastructure, federal transfers, aggressive population control policies, and a two-way flow of population that varied according to employment availability. Some of the strategies used by the program were questionable because Puerto Rican workers in the U.S. were often exploited and lived in very poor conditions.

#### **4.4 Establishment of the Commonwealth of Puerto Rico and Post-War Development**

Puerto Rico greatly benefited from Operation Bootstrap and from the capital flow following World War II. Some of the subsequent political changes that were seen in Puerto Rico were the result of the U.S. prosperity and of its increasing leadership as a world power (Scarano, 2000). In the aftermath of World War II, the U.S. emerged as a world power committed to extending the values of freedom and democracy throughout the world. Consequently, in an attempt to formalize the status of Puerto Rico, in 1952 the U.S. Congress passed Public Law 600, authorizing Puerto Rico to draft its own constitution and elect its own government. However, the elected government was to manage only local affairs. The constitution was ratified on March 3, 1952 and became effective on July 25, 1952. In the eye of the laymen, Puerto Rico became the commonwealth of Puerto Rico or the “Estado Libre Asociado” (Free Associated State, ELA). Nevertheless, the relationship between the U.S. and Puerto Rico has been very polemic and unclear. Since then, in several federal forums, including the Department of Justice, the U.S. Supreme Court, and more recently in the 2007 report of the U.S. President’s Task force on Puerto Rico’s status, the island is referred to as holding a territorial status. Although the political status describing the relationship between the United States and Puerto Rico is often referred to as a “commonwealth”, under federal law the constitutional status of Puerto Rico is considered an “unincorporated territory”. The territorial status provides the United States with the power and authority to change the political system of self-government in Puerto Rico referred to as “commonwealth” (President’s Task Force on Puerto Rico’s status, 2007). Morrissey (2006) argues that the establishment of the ELA transformed civic engagement in two important ways. The ELA created expectations

on the role of the State and also provided a space for increased demands for social security and insurance. More importantly, Morrissey (2006:34) argues that there is a disjunction between the population's expectations and the capacity of the Puerto Rican State to perform under the current political arrangement. These issues are of particular importance to any discussion on emergency preparedness and response in Puerto Rico. The PR Emergency Management Agency cannot be removed from the social context in which it operates and understanding how it performs under such arrangements is crucial for disaster reduction.

Historically, the U.S. government has appeared as the external driver of the island's economic development, providing direction to numerous changes in Puerto Rico. Due to a great extent to the economic assistance of the United States, the island has transitioned from a subsistence agricultural economic model, to a capitalist agricultural model, to an industrial export-led model, and more recently, to a service economy. Collins, Bosworth and Soto-Class (2006) describe Puerto Rico as a tale of two economies, in which better quality of life indicators are observed when compared to other places in Latin America. But, when compared to the U.S. mainland, island residents continue to have the highest poverty levels. In fact, the income gap between the island and the mainland is increasing, instead of decreasing as it would be expected in a developing high income economy.

#### **4.5 Development Outcomes: The Puerto Rican Paradox**

Puerto Rico has undeniably benefited from its relationship with the United States. Some of the benefits observed in Puerto Rico include a reduction in poverty, the enhancement of the health services system, and improvements in the living conditions of the population. Colón Reyes (2005) contends that in the 1930's poverty

was present in more than 80% of the households and that the mortality rate due to diseases such as tuberculosis and malaria was one of the highest in the Western hemisphere. Nevertheless, it is important to acknowledge that these years also brought many positive changes. The educational institution was dramatically improved (Institute of Field Studies, 1950). In 1899, 80% of the population 10 years and older could not read or write. In the first years of U.S. domination the number of schools and teachers dramatically increased. By 1935 the illiterate population was reduced to 35% and advanced education institutions like the University of Puerto Rico in Río Piedras and the Agriculture and Mechanics Arts College (today known as the University of Puerto Rico-Mayaguez) had been established (Castro-Arroyo and Luque de Sanchez, 2001).

However, while Puerto Rico presents some of the economic, health, and social well-being characteristics of an advanced society, it also faces daunting challenges. Puerto Rico continues to struggle with unemployment and underemployment, with high levels of poverty, a deteriorated educational system, steep production costs, disproportionate dependence on the decaying industrial sector, excessive public debt, a weak tax system, and an aging infrastructure. Given the financial limitations, Puerto Rico has developed a State that depends heavily on federal funding and that is unable to sustain the advances achieved without external assistance (Dietz, 1986).

Bosworth and Collins (2006:19) use the Gross Domestic Product (GDP) per worker and the Gross National Income (GNI) to explain the performance of Puerto Rico's economy and the income gap between the island and the mainland. In 1950 the GDP of Puerto Rico was 30% that of the mainland. Thirty years later, in 1980, the GDP was 75% of the U.S. average. This measure presents a dramatic improvement

from 1950 to 1980. In contrast, the GNI, which represents the income that stays in Puerto Rico, presents a less favorable scenario. In 1950 the GNI of Puerto Rico was approximately 20% of the U.S. average. In 1980 the GNI had increased to only 40%; it has decreased to about 30% since then. These two measures allow us to identify two of the most complex challenges facing the development initiatives implemented in the island. The authors contend that the difference observed in the two measures show the distortion of the GDP measure because much of the income reported as earned in the island actually ends up on the mainland. In addition, the difference suggests a practice in which U.S. corporations overstate the value added of goods produced in Puerto Rico to escape the U.S. tax system. The authors present low labor force participation as another characteristic of Puerto Rico's economy together with limited job opportunities, the existence of an informal economy, and the trivial incentives of job seeking, as possible explanations for this pattern.

Dietz (2003) explains that since the 1980s there have been a number of economic and political changes that have not only transformed the economic model of Puerto Rico but that have brought about new challenges for policy makers. In response to the challenges confronted by the economic reforms came the increase in the demand for federal financial assistance transfers for social and economic programs. The end of the economic bonanza observed in the island from 1950 to 1970 called for more social and public assistance programs (see Morrissey, 2006). In addition, the gradual elimination from 1995 to 2005 of the exemptions offered by Section 936 of the Federal Tax Code to U.S. corporations investing in Puerto Rico, has also affected the economy of the island. The Federal Tax Code now classifies Puerto Rico as a foreign

jurisdiction for tax purposes, making the island less attractive to U.S. investors when compared to other arguably more profitable sites.

Following the elimination of tax-exemptions for U.S. corporations, an increasing amount of them have decided to terminate operations in Puerto Rico, resulting in an increasing unemployment rate that surpasses 24%, if the population that has stopped seeking employment, also known as discouraged workers, is taken into account (El Nuevo Día, May 6, 2002). Moreover, the implications and consequences of the development policies implemented in Puerto Rico have not affected all municipalities equally. Municipalities in the interior have experienced the least development. There are also great differences among developing coastal urban metropolitan areas. For instance, in 1993, when fifty industries decided to shut down their operations in Puerto Rico, the loss of employment in the Western region was alarming (El Nuevo Día, March 24, 1993). Most of the industries leaving the Western region of the island were those producing clothing and electronics. In 1999, the closure of the Star Kist Tuna industry, one of the largest employers in the region, resulted in a loss of 13.3% of the total manufacturing jobs in the Western region. In fact, in 2000, according to the Bureau of Labor Statistics, Mayaguez occupied the first place in the list of U.S. metropolitan areas with the highest loss of employment (2,900 jobs) in a one-year period. While it is argued that Puerto Rico is transitioning into a service economy and that new jobs in that sector are being created, they are not enough to absorb the increasingly unemployed population, and the salaries in the new service oriented jobs are lower than the salaries in the industrial sector. Alameda (in Periódico El Nuevo Día, June 4, 1999) states that while the jobs lost had an average

salary of \$6.50 an hour, the jobs created in the service sector pay an average salary of \$5.15 an hour.

The pattern of economic insolvency, the constant increase in public sector employment, and the increasing corruption by government officials, has generated a critical and fallible economic situation. In May 1, 2006, the government had to shut down for the first time in the history of Puerto Rico, given its incapacity to cover the payroll for the rest of the fiscal year. The shutdown was mainly due to the inability of the two main political parties, the Popular Democratic Party (PPD) and the New Progressive Party (PNP), to come to an agreement on the establishment of a sales-tax to reduce the island's debt, it highlighted the tense political environment. The current situation of Puerto Rico makes apparent the burden of decades of failed governmental maneuvering to absorb the growing labor force and facilitate economic activity. In 2009 a fiscal stabilization was enacted to reduce government spending and increase tax revenues. The financial situation of the island has improved and the increasing reduction in government spending is regarded as vital, but is still necessary to continue eliminating public deficit and reducing public debt.

Taking into account the economic hardships, the political arrangements, and how these have impacted the culture of Puerto Rico is important when discussing issues of policy transfer, emergency management, and social vulnerability. As argued by Weber, politics and the pursuit of policies are social actions because they are oriented towards others. Emergency management occurs in a larger social context in which human behavior takes place and in which organizations operate.

## Chapter 5

### **THEORY: MAX WEBER AND THE RATIONALIZATION OF MODERNITY**

Social theories help us make sense about the social world. Theories help us understand social phenomena because they identify the conditions upon which a specific type of behavior is likely to occur (Schutt, 2004). Theories shed light into the specific issues, dynamics, and areas that research should cover. This chapter discusses the theoretical influences that guided my dissertation research. The work of Max Weber was particularly valuable to help me think about emergency management and the dynamics of social vulnerability because his approach is not focused on placing individuals into social categories. Rather, Weber's approach to sociology seeks to integrate multiple perspectives to understand how "reality" is observed and constructed by different social actors.

Freudenburg (1993) argues that the changes that have taken place since the Industrial Revolution in the role of institutions highlight the need to focus on the institutions responsible for risk management. Although the creation of risk and disaster management institutions has translated into a reduction in human losses associated to disasters, economic losses continue to increase. In the 2011 Annual Statistical Review of Disaster published by the Center for Research on Epidemiology of Disasters, Guha-Sapir, Vos, Below, and Poserre (2012) stress that 2011 was the costliest year in history in terms of losses associated to natural disasters and catastrophes. This highlights that disasters are not accidental or "natural" but fundamentally social.

Sociologists study the behavior of humans in a social context (Andersen and Taylor, 2006). The advancement and application of social theory to examine society is at the core of sociology. As a science, sociology seeks to understand social organization, interactions, and the emergence, transformation, or perpetuation of social arrangements. Therefore, it is not surprising that some sociologists are interested in disasters. Although predominantly ignored in mainstream sociology, disasters and emergency management organizations afford an opportunity to study the dynamics of social organization and organizational change (Stallings, 1987).

The questions asked by social scientists studying disasters are at the core of social science research. The methodological challenges, particularly in the development of measures that can capture diverse social realities are also observed in disaster research. Scholars who study social vulnerability to disasters develop conceptual schemes that seek to illustrate how people can be in a situation in which they may be affected by an environmental hazard, and also have limited reliable social, institutional, economic, and political resources to protect themselves, others, and their livelihoods.

However, sometimes social scientists working within the social vulnerability approach think in a categorical way that challenges our ability of integrating multiple perspectives. In other words, as researchers we define what vulnerability is and who may be considered vulnerable. In this research I studied the emergency management organization within a larger social context to understand not only its evolution, but also to get a sense of how current governance and organizational structures shape emergency management services and preparedness efforts. To do so, I integrated multiple perspectives about disasters and emergency management in Puerto Rico, and

about how the communities surrounding the fuel storage facility in Cataño responded to the 2009 explosion. My goal was to bring together multiple perspectives on emergency management in communities that according to taxonomic approaches are considered socially vulnerable.

## **5.1 Organizational Theory**

There is a wide array of theories to understand organizations that have been applied by numerous disaster scholars. Naturalistic theories for example, see environments as creating different opportunities. Organizations are perceived as open systems being influenced and shaped by the environment in which they exist. Rationalism and its associated theories perceive social action as derived from people's beliefs but following the dictates of reason. Therefore, the system is a closed one in which a decisions are made based on reason and not a direct result of the environment. Rationalism deviates from naturalism by highlighting self-interest and the purposive elements of human action. Rational choice theory departs from the notion that if individuals act rationally, the collective is benefited (March J. and H. Simon. 1958).

Organizational theory builds on the sociological analysis of bureaucracy to study its different types and forms. The importance and need to better understand organizations became apparent with their increasing role in society. Organizational theory attempts to identify ways to make organizations attain their goals more effectively. Earlier approaches emerged with the increasing interest on rationalization and on how structures control individual behavior (Heffron, 1989). Following Weber's approach, one of the earliest sociological works on organizational management and efficiency is that of Frederick Winslow Taylor which was first published in 1911 under the title of *The Principles of Scientific Management*. Taylor, continuing in the

Weberian tradition, focused on the “best way” to perform tasks in an organization and on how workers should be trained to perform those tasks efficiently. He proposed three main principles that in his view would increase profitability. Taylor (1911) argued for a systematically simplified division of labor, for complete managerial control and coordination of production, and for increased accountability. Taylor was strongly criticized because of his strong focus on a single best way to perform tasks and because of his simplistic view of workers as malleable objects without individual will and motivations (Waring, 1991).

While Taylor made important contributions to management literature, Max Weber is regarded as the pioneer of organizational theory (Clegg, Courpasson, and Phillips, 2006). Max Weber (1927) defined bureaucracy as “goal-oriented organizations designed according to rational principles in order to efficiently attain the stated goals”. Weber predicted that bureaucracies would become the dominant structure of industrial societies. His prediction of the role of organizations has proven to be truthful and have raised the need to study them.

## **5.2 Max Weber’s Theory of Rationalization**

Weber’s theory of rationalization and its associated measurement perspective is useful to understand bureaucracy and its impact on society. Disaster researchers have used the work of Weber to guide their research on emergency management, particularly on how established procedures often function as organizational and cultural impediments during disaster response (Webb, 2006). The work of Weber is particularly useful to think about decision making during disasters because he perceived human beings as creatures oriented towards meaning and subjectivity (see Allan, K. 2005. Explorations in Classical Sociological Theory). One of the main

themes that can be identified in the work of Weber is his interest on how rationalization has changed the inherent orientation of civilization. When thinking about emergency management, Weber's ideas on rationalization allowed me to think about how through rational decisions emergency management has become increasingly standardized. In the case of Puerto Rico, the process of rationalization is compounded by political factors steaming from the relationship of the island with the United States and from the bi-partisan control of power in the island's government.

To understand the process of rationalization, Weber advanced social scientific research methods with the introduction of very valuable concepts such as the "routinization of charisma" and the "iron cage of bureaucracy". Moreover, Weber advanced the use of ideal types as a basic method for sociological analysis. The use of ideal types was useful for my work because it allowed me to understand, contrast, and integrate different perspectives about the emergency management organization and about how their services are delivered and received.

### **5.3 Weber's Study of Bureaucracies**

At the end of the 18th century European bureaucracies had developed to a point that intellectuals at the time were interested in analyzing their political function. The work of Weber is distinct in its focus. For example, while social structure and hierarchies are a major focus of the work of Durkheim, social action is the primary focus of the work of Weber. Social action is defined as "a type of behavior that is oriented to the behavior of another actor, to which the actor attaches meaning" (Swedberg, 2005). Weber's overarching interest was to explain how modern societies differ from traditional societies. He argued that the shift in human behavior was a result of a shift in the orientation of social action. Weber claimed that with the

increase in rationalization, human beings came to be more aware and concerned with efficiency and therefore with the adoption of goal-oriented rationality.

To better understand social action, Weber offers a typology of social action. Weber's typology identifies four major types of social action that include: instrumentally rational social action (zweckrational), value-rational action (wertrational), affective action, and traditional action. Instrumentally rational social action is an action that is rationally chosen to attain a specific goal and is embodied in a bureaucracy. Value-rational action is a type of action oriented towards an irrational goal but that is pursued through rational means. Affective action is based on emotions and does not take into account a rational assessment of the goal, means, and ends. The last type, traditional action, is one guided by custom and practice. Weber argued that human behavior was a combination of social actions.

Weber argues that with the increase in rationalization behavior becomes less dominated by affective and traditional types of social action. Weber was not simply interested in the individual motives that translate into specific types or combinations of different types of social action. Rather, the main focus of his work is on factors that have facilitated the rationalization that has taken place in Western societies. Weber was interested on how the emergence of bureaucracies results from an increasing rationalization that has effects on social action. He stressed that bureaucracies allow the coordination and control of action in society at large. In Weber's view, an ideal bureaucracy is capable of planning and coordinating social action at a large scale while assuring the emergence and subsistence of modern societies.

According to Weber, the bureaucracy can also have negative effects on society because it can create a class with the power to impose their own agendas. This is

because as the power of the bureaucracy grows, so does grow its authority to dominate society. Weber identified three types of authority: traditional, rational-legal, and charismatic. In pre-modern societies traditional authority dominates social relations. Traditional authority is passed through heredity and perpetuates the status quo. Rational-legal authority relies on legally established impersonal rules. This type of authority goes hand in hand with the increase in rational social action and is characteristic of modern societies. Charismatic authority facilitates social change. Charismatic leaders rely on the support of others and can challenge the current bureaucracy. Bureaucrats cannot do this because they must follow the rules of conduct of the bureaucratic organization (Weber, in Gerth and Write Mills, 1946). Bureaucracies are able to dispense of workers and of their capacity to change their social status and attain structural mobility if they violate the rules of conduct or the established procedures. Weber called on politicians to counter bureaucratic power. According to Weber's conceptualization politicians can facilitate the institutionalization of charismatic movements and challenge the rational routinization that takes place in bureaucracy (Weber, in Gerth and Write Mills, 1946). He argued that because politicians need the political support of the people they could challenge the bureaucracy. Nevertheless, bureaucrats could also submit politicians to their will because they may have a better knowledge of the system due to their more prolonged permanence.

#### **5.4 The Ideal Type of Bureaucracy**

In order to study bureaucracies, Weber developed an ideal type of bureaucracy. Weber's ideal type of bureaucracy serves as a measurement to examine social institutions. In his view, a bureaucracy has a hierarchy of authority, is impersonal, has

written rules, established promotion procedures, has a specialized division of labor, and efficiency is considered a top priority. Therefore, Weber's work (in Gerth and Write Mills, 1946), characterizes modern bureaucracies as structures that:

- 1) Have strict jurisdictional areas usually ordered by laws
- 2) Separate public and private property. The resources of the office are for the completion of duties associated to the employment.
- 3) Officials receive a salary to perform regular activities for those governed and those activities are distributed among bureaucrats using an official pre-established method.
- 4) Authority to give commands is distributed in a hierarchical way and mechanisms of coercion are available to officials in order to assure stability.
- 5) There is an established method to determine citizenship and to determine the qualifications that grant eligibility for employment in the bureaucracy.
- 6) Employment in the bureaucracy is long-term and secured.

While bureaucracies have the potential of increasing efficiency, one of the first challenges presented by bureaucracies was their potential to be dehumanizing because of impersonality.

### **5.5 Levels of Analysis and Flexibility in Organizational Thinking**

Classic theorists, such as Weber, had a mechanistic view of bureaucracies in which although human beings form the organization, they are not perceived as indispensable but interchangeable. In response, human relations theorists argued that organizations are part of a social system and therefore informed by factors internal and

external to the organization. In the 1940s, the humanist school of administration shifted the focus of organizational theory to the individual worker's needs and behavior within organizations (e.g. Maslow, 1943). They argued that bureaucracies fail to fulfill the needs of human beings working in them because they constrain personal growth, have a tendency to generate conformity, ignore informal organization, does not have the capacity or authority to completely control individuals, human resources are not used in their full capacity, communication is distorted by hierarchies, among many other critiques (see Bennis, 1970). Although the humanist school emerged out of the dissatisfaction of its theorists with the lack of attention that classic theorists gave to the individuals in the organization, their strong focus on individuals was also critiqued.

In order to gain a balance, the organization development approach emerged in the 1970s with a twofold concern: the satisfaction and growth of individuals, and the achievement of the goals of the organization. In addition to the organization development approach, the new management science approach emerged during that time with a strong focus on decisions and their impact on the organizational system. The new management science approach shifted the attention back to the organizational structure and to how through the use of computerized management systems the individual in the organization can be led towards rational decisions.

After the 1970s the cultural approach highlighted the importance of culture over the formal dimension of the organization. The cultural approach perceives organizations as cultural systems with distinct features that are based on cultural values, norms, and socialization (Heffron, 1968). Simultaneous to the development of the cultural approach, the political approach brought to the discussion a focus on

power and conflict. The political approach argues that the constant power struggles taking place in the organization affect the distribution of resources and the role played by its different members.

Common to all the approaches discussed is that they often support the idea that there is a “best way” for an organization to operate. There are two approaches that question this proposition, the open systems approach and the contingency approach. The open systems framework perceives the environment as playing a crucial role in the performance of an organization (Katz and Kahn, 1971). Therefore, while open system theorists recognize that there are many similarities among all organizations, they also contend that there are many differences because organizations operate in different environments and have different priorities. Contingency theorists emphasize the importance of improvisation in management processes. Wachtendorf and Kendra (2005) underline that improvisation works as a capacity that allows emergency managers to accumulate a repertoire of knowledge and skills that they can draw upon during disasters to attend emergent needs.

## **5.6 Theoretical Roadmap**

In sum, Weber’s theory served as a guide that helped me develop my ideas and develop a more elaborate understanding of emergency management and social vulnerability to disasters in Puerto Rico. When I started this project, I wanted to understand how emergency management is practiced in places that according to taxonomic approaches were considered as highly vulnerable. The idea was not to generalize but to understand how the emergency management agency functions. While I was doing my field work the CAPECO explosion occurred and it served as an

opportunity to further delve into my interest of how the emergency management organization deals with emergencies in highly vulnerable communities.

The work of Max Weber was particularly valuable to help me think about emergency management and the dynamics of social vulnerability because his approach is not focused on placing individuals into social categories. Therefore, I was able to move beyond taxonomic approaches that seek to operationalize social vulnerability as a function of a set of demographic and socio-economic characteristics. My goal was to integrate multiple perspectives about how the emergency management organization has evolved, how it operates, and how their services are delivered in a context that according to taxonomic approaches presents high levels of social vulnerability. Weber's approach to sociology served as a model to integrate multiple perspectives to understand how "reality" is observed and constructed by different social actors. At the same time, tracing developments in organizational theory helped me to refine my interests and allowed me to elaborate my research.

## **Chapter 6**

### **THE PUERTO RICO EMERGENCY MANAGEMENT AGENCY AS AN IDEAL TYPE OF BUREAUCRACY**

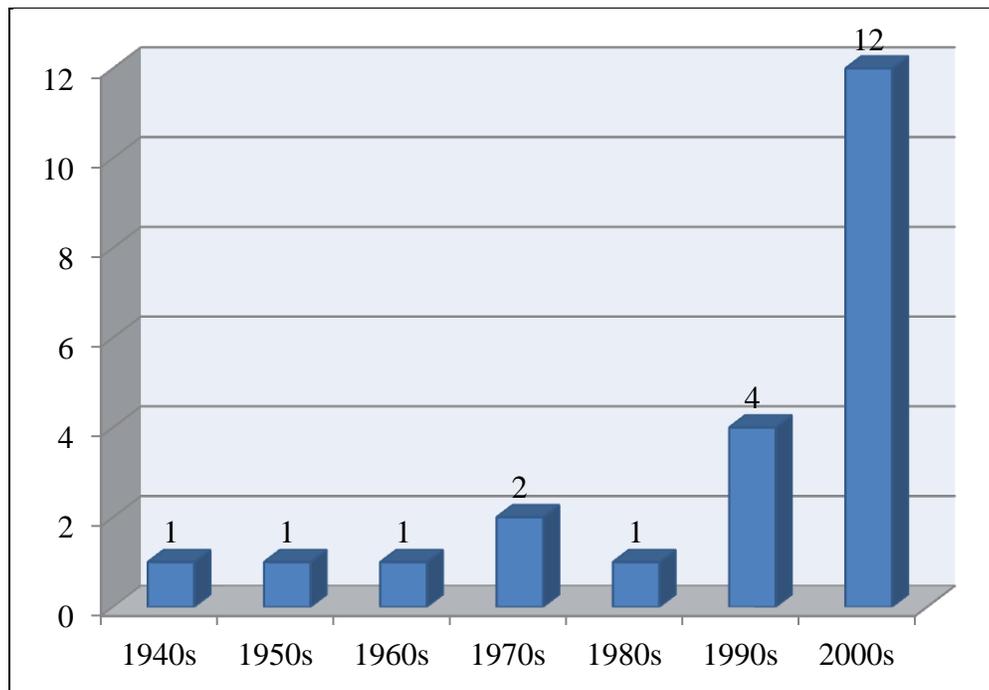
Drabek (1991) defined emergency management as “applying science, technology, planning and management to deal with extreme events that can injure or kill large numbers of people, do extensive damage to property, and disrupt community life.” Emergency managers dedicate their careers to find ways to reduce community disruption, and to protect lives and property. As the field of emergency management evolves, managers are increasingly seen as avid coordinators who facilitate connections throughout the government apparatus to address sources of environmental or man-made dangers.

Until recently, what we call “emergency managers” were predominantly bureaucrats expected to react in the event of a disaster. Although emergency management was conceptualized as having four phases (mitigation, preparedness, response, and recovery), the focus of public policy, and the practice of emergency management was largely focused on responding to emergencies that affected the population in different jurisdictions. Researchers highlight that despite the changes observed in emergency management over the last two decades, there are also many differences in terms of access to resources, training, responsibilities, and skills among emergency managers (Rodriguez, et al. 2006).

This chapter discusses the evolution of emergency management in Puerto Rico. Using Max Weber’s conceptualization of the ideal type of bureaucracy as a guide, I

discuss issues of precision, speed, uncertainty, knowledge and learning, continuity, unity, subordination, reduction of function, and reduction of material and personnel costs in the Puerto Rico Emergency Management Agency. Appendix C includes a chronology that lists emergency management legislation, and selected disasters in the United States and Puerto Rico. The purpose of creating that chronology was to trace and understand the evolution of emergency management policy in Puerto Rico and how it relates to changes in U.S. emergency management policy. Figure 6.1 shows an increase in the number of laws specific to emergency management over the last two decades.

Figure 6.1: Number of Emergency Management Laws 1940-2011



## **6.1 The Early Years of Civil Defense in Puerto Rico**

As it is the case in the United States, what is known today as the Commonwealth Emergency Management Agency was originally the Civil Defense Corp. Before the creation of the Civil Defense, emergencies were managed by residents themselves with little assistance from government authorities. There were limited ways to disseminate warning information and forecasts to the population. The integration of communication technologies greatly changed the impacts of severe weather. Table 6.1 presents a historical report compiled by National Weather Service meteorologist Oliver Fassio to show how the dissemination of warning information changed the outcomes of Hurricane San Ciriaco and Hurricane San Felipe. The high death toll associated to Hurricane San Ciriaco was partially due to the lack of an effective warning system; residents received the storm unannounced. In contrast, warnings for hurricane San Felipe were distributed to all municipalities using radio and telegraph, and the number of fatalities decreased ten folds.

Table 6.1: Hurricane San Ciriaco and Hurricane San Felipe Comparison

<b>San Ciriaco and San Felipe Losses Compared</b>	<b>San Ciriaco (Aug/8/1899)</b>	<b>San Felipe (Sept/13/1928)</b>
Loss of Life in Puerto Rico	3,000	300
Lowest barometer reported at Guayama	27.75"	27.65"
Lowest barometer reported at San Juan	29.23"	28.81"
Duration of hurricane winds at San Juan	3 hours	12 hours
Maximum Velocity of Wind at San Juan	75 mph	150+ mph
Advance Warnings of Storm	*18 hours	36 hours
Property Losses	\$20M	\$50M
Greatest Rainfall at Adjuntas, P.R.	25.0 in	29.6 in
* Owing to lack of facilities for prompt distribution of the warning to the rural population, the storm struck unannounced. (Source: Fassio, O.L. San Felipe: The Hurricane of September 13, 1928. Public document. Obtained from PREMA Public Documents Office.)		

In Puerto Rico, the Civil Defense Corp was created by Governor Rexford Tugwell, under the rule of democratic president Franklin D. Roosevelt, established under Law 33 on April 16, 1942. The Civil Defense was originally a federal initiative after the Pearl Harbor attack. The focus of the newly created organization was to prepare a government continuation and civilian protection program to be deployed in the event of a nuclear attack. Because of Puerto Rico’s geographic location, and the U.S. military bases that were located on the island, federal and local governments deemed the creation of a civil defense program in the island as important. The organization was initially focused on education activities through the process of training volunteers and communities to protect themselves from a nuclear attack (Puerto Rico Civil Defense, 1997).

In line with what was also happening in the United States, in the aftermath of World War II the focus of the agency gradually shifted from man-made hazards (e.g. nuclear attack) to include natural hazards (e.g. hurricanes, precipitation events, and the

like). In the United States, the ad-hoc approach that had been followed to deal with natural disasters was changed when the Disaster Relief Act of 1950 was adopted. Until then Congress would authorize disaster relief through laws created for each event in order to disburse disaster relief funds. The Disaster Relief Act of 1950 provided comprehensive guidelines for federal agencies involved in the distribution of federal aid.

In 1956, Hurricane Betsy (known in Puerto Rico as Hurricane Santa Clara) resulted in a major disaster. According to historical records, Hurricane Santa Clara resulted in over \$40M losses, 16 deaths, and about 15,000 destroyed houses. One of the first measures taken by the government of Puerto Rico to standardize the distribution of aid was the creation of the Commonwealth Emergency Fund in 1966 under the Commonwealth Department of the Treasury. The Commonwealth Emergency Fund could be used to protect lives and property, public credit, or for unexpected public needs, including those resulting from war, hurricanes, earthquakes, droughts, floods, and pests.

In Puerto Rico, Law 22 of June 23, 1976 established the Civil Defense Agency. Law 22 transformed the Civil Defense from a dependency of the Commonwealth government to an agency. The new organization was not only tasked with the responsibility of developing a civil defense plan, it was now expected to develop regional committees to identify hazards that were particular to each area. The Civil Defense Agency was also tasked with the creation and maintenance of a “State Plan for Emergencies and Disasters Control”. The plan was required to include: 1) measures to be taken for effective and immediate action in case of emergency, 2) measures for personal and property damage prevention and/or reduction, 3)

descriptions of the assistance to be offered by the agency, 4) identified vulnerable areas, 5) an active search and rescue program, 6) guidelines for coordinating emergency safety efforts with the local and federal agencies, 7) a plan to work with the media, 7) the organization of mobile defense units, 8) a comprehensive government continuation program, 9) rules and procedures for the creation of municipal Civil Defense offices, 10) established requirements for the creation and functions of the Civil Defense Voluntary Corp, and 11) a disaster relief and cooperation program for international emergencies and disasters. Law 22 also specified that the director of the Civil Defense Agency would be appointed by the island's governor and that changes made to the Puerto Rico Civil Defense Agency would be in line with emergency management functions in the United States and in other countries. The shift towards a larger bureaucracy was also illustrated by relocating the organization from the San Cristobal Fort to a more centrally located building in the San Juan area known as Miramar. Edna Santiago de Hernández, who was a member of the Commonwealth political party council and who had been a senator for the Aguadilla district from 1968 to 1972, was appointed as the new director of the agency. Santiago was the first women and civilian to serve as director of the Civil Defense.

At the municipal level, Law 22 facilitated the creation of municipal Civil Defense offices. Municipal offices were to be headed by a municipal director that was to be appointed and supervised by each Major. Municipal offices were also expected to generate an emergency and disasters operations plan and to organize local volunteer groups. In line with the agency's new scope of work, in 1977 the Puerto Rico Urban Search and Rescue academy was established in the municipality of Naguabo.

Following the climate of increased attention to natural hazards in U.S. public policy, in 1977 the Program for the Mitigation of Risks was also created in Puerto Rico and housed in the Department of Natural Resources.

At the federal level, the Federal Emergency Management Agency (FEMA) was also established in 1979. Although many changes in the scope of the original Civil Defense were observed, the policy of the commonwealth still maintained a strong focus on defense. The Civil Defense Agency was still expected to maintain and practice drills for aerial attacks, to devise plans for shutting down lighting, and a government continuation and population control plan. Although the Civil Defense organization grew significantly after the 1970s with the creation of offices in all municipalities, the agency continued to be predominantly focused on response until the 1990s. At the federal level, in 1991 FEMA created a satellite office for Region II in Hato Rey, Puerto Rico. Region II serves New York, New Jersey, Puerto Rico, and the Virgin Islands. The regional office serves Puerto Rico and the North American Virgin Islands of St. Thomas, St. Croix, St. John and Water Island. According to FEMA (2013), the regional office was established to reduce response time in the event of any disaster because the area is considered prone to hurricanes, floods, and seismic activity. The office also provides strategic support for mitigation programs (see also, Bea, et al., 2004).

Another change that extended to Puerto Rico was the shift towards professional emergency management that was adopted by James Lee Witt, the first professional emergency manager appointed to the position of director of FEMA. In Puerto Rico, two focusing events took place in the 1990s: the explosion at the Humberto Vidal store in the municipality of Rio Piedras (located in the metropolitan

area of San Juan) and Hurricane Georges. Humberto Vidal is a local chain shoe store that had one of its main storages in Rio Piedras. On November 21, 1996, an undetected gas leak combined with heat to generate a major explosion. As a result of the explosion, the building was destroyed, over 30 people were killed, and more than 80 were injured. One of the major problems that were detected was that there was no map that included the underground infrastructure of all agencies. The water system in the area had been repaired recently and high pressure was unintentionally placed on the gas pipeline system, causing a leak. At the time, the island was also recovering from hurricanes Marilyn and Luis, which had affected the island in 1995.

In 1997 the federally funded Project Impact program was also launched. Project Impact sought to promote disaster resistant communities through the mitigation of local dangers. Project Impact represented a shift in emergency management at the federal level from a reactive to a proactive approach. Over time, the responsibility over natural hazards mitigation is increasingly assigned to the emergency management agency. Law 207, signed on December 30, 1997 transferred mitigation and planning for natural risks programs from the Department of Natural Resources to the Civil Defense Agency. Another change in the management of emergencies that took place that year was the establishment of the Corp of Medical Emergencies, a service that until then was coordinated by the Firefighters Corp. As the approach to emergency management was changing, Puerto Rico was affected by Hurricane Georges.

Hurricane Georges made landfall on September 22, 1998 and is regarded as the worst disaster in the island's recent history. Over 30,000 houses were shattered, about 50,000 had major or minor damage, and 100% of the power service was interrupted.

The agriculture and poultry industry were severely affected. Property damage was estimated at about \$1.7 billion and crop damage was estimated at a bit over \$301 million. A good portion of the damage was due to flooding and not necessarily to wind damage.

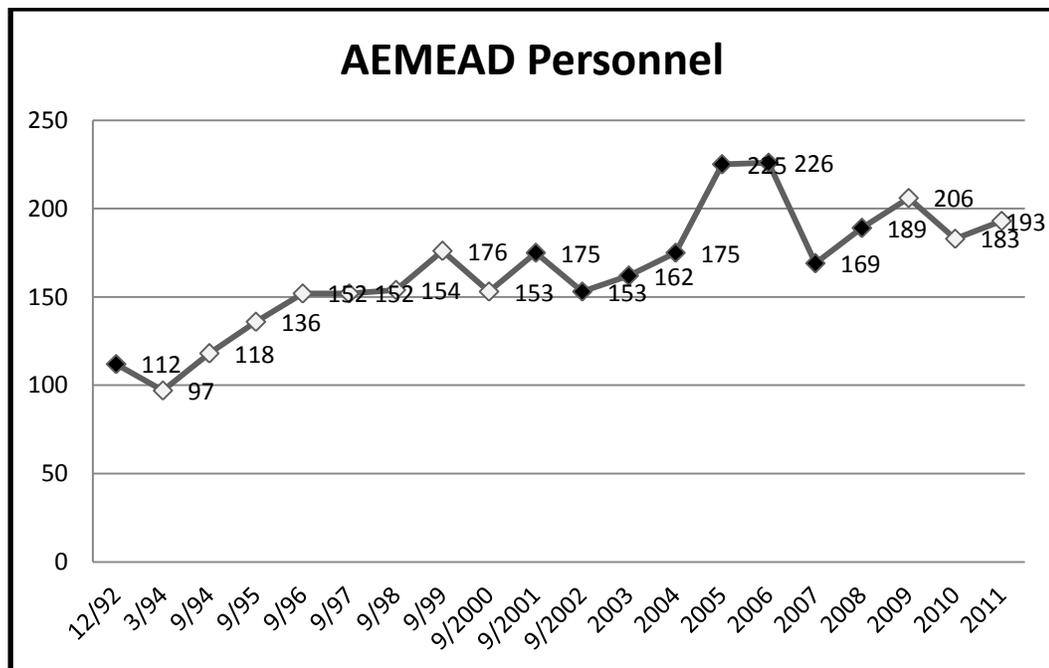
In response to Hurricane Georges, in 1998 the local government implemented the “Nuevo Hogar Seguro” (“New Safe Home”) program. The “Nuevo Hogar Seguro” program was focused on promoting mitigation and helped rebuild homes destroyed during Hurricane Georges. FEMA also provided funds to cover the insurance policy costs of 3, 255 families that had being affected by flooding. The idea was that these families would later pay to maintain their insurance policies active. Although the families committed to pay for their policies once FEMA funding would end, they were unable to cover the costs. In 2002, PR Executive Order 2002-21 authorized the payment of \$846,300 from the Commonwealth Emergency Funds to cover the flood insurance costs of those families.

The biggest change observed in the emergency management organization during the 1990s was the transformation of the Civil Defense Agency into the Commonwealth of Puerto Rico Emergency Management and Disaster Administration Agency in 1999. Other important changes that took place in this decade were the establishment of the 9-1-1 calling system in 1994, and naming the American Red Cross as the leading disaster volunteer organization in 1999.

Law 211 of April 2, 1999 remains as the most important piece of legislation during that decade. That piece of legislation introduces the “Commonwealth of Puerto Rico Emergency Management and Disaster Administration Agency Act” and defined emergency management as “the rational process through which a society is prepared

to deal with the consequences associated with natural events or those created by man” (Law 211, 1999:2). This new organization was to be focused on interagency coordination. As stated by state level participants of the interviews, PREMA has become “the emergency resource coordinator agency of Puerto Rico’s government”. In addition, the agency promotes mitigation through volunteer training programs and through citizen education initiatives. Figure 6.2 shows the increase in personnel as the new agency was created.

Figure 6.2: Commonwealth Emergency Management Agency (Number of State and Regional Managers)



Another Law signed in the 1990s that is relevant to further understand how the governance of disasters is shared, is Law 81 of August 30, 1991-The Autonomous

Municipality Law. The main goal of the legislation is the decentralization of public administration. Law 81 conceded administrative and fiscal autonomy to municipal governments. Among some of the expectations for autonomous government entities were the creation of land use, land management, resource conservation, sustainable development, and emergency management plans. Law 81 eliminates the power of the central government to impose its decisions to the municipalities.

To further disaster reduction efforts, Law 150, a post-Hurricane Georges policy, was signed on August 10, 2000. This piece of legislation established the Law on Education in Prevention and Emergency Management and Disasters in Puerto Rico. Law 150 stressed that Hurricane Georges highlighted the need for preparedness and declares disaster prevention as the public policy of the island's government. This law created a committee of representatives from several commonwealth agencies involved in emergency management activities, and with the Puerto Rico Seismic Network. The committee was tasked with the creation of a master education plan to be submitted as a guide to the Secretary of Education. Once the committee creates the master education plan, the policy requires the creation of a Prevention and Emergency Management Plan by the Department of Education for all public schools.

The Commonwealth Emergency Management and Disaster Administration Agency also contributed to the 9/11 response. Through PR Executive Orders 2001-45 and 2001-46, signed on September 11, governor Sila María Calderón authorized the use of personnel, equipment, and of up to \$1M from the Commonwealth Emergency Fund to cover emergency transportation and incidental expenses. On October 2, 2001 a subsequent PR Executive Order (2001-57) stressed that because of the historical ties of Puerto Rico with the City of New York, and because of the large number of Puerto

Ricans living in the City, the September 11 attacks called upon the generosity of the local population. Agency and Public Corporation directors were asked to coordinate the collection of donations for a televised fund raising event. Employees could donate money or vacation days to contribute. Post 9/11 federal policies were also adopted in Puerto Rico. In 2003 an interagency coordination system for the management of terrorist attacks was adopted. An inter-religion ministry resource was also created for the Commonwealth Emergency Management Agency.

In compliance to the requirements of the 2000 U.S. Disaster Mitigation Act, in 2004 the Commonwealth government created and adopted the Natural Hazards Mitigation State Plan. The plan stresses once again a shift from a reactive to a proactive approach in emergency management. The plan outlines emergency management procedures for all levels of emergency management and was created as a requirement to receive disaster assistance funding from federal programs (PR Executive Order 2008-41). Municipalities are required to prepare their own plans following federal guidelines, submit them to FEMA, and revise them every three years. The Emergency Operations State plan adopts the Emergency Support Function concept used in the Federal Emergency Operations Plan and also adopts the National Incident Management System. This change requires increasing collaboration and interoperability among agencies sharing emergency support functions.

A step that highlights the linkages between the characteristics of a community and disaster impacts is Law 69 of March 10, 2006. That piece of legislation amended Law 211, Article 7 of the Emergency Management Agency Law. Law 69 acknowledges that throughout history marginalized communities have been affected the most in emergency situations and waives all charges for training, workshops,

courses, seminars, and/or conferences offered by the State Agency for Emergency Management in non-profit community organizations located at designated “special communities”.

Important and recent mitigation legislation is Law 24 which was signed on March 18, 2008. Law 24 presents the protocol for the Mitigation of Landslides Risk in Puerto Rico. This legislation mandates the State Agency of Emergency Management to, in coordination with the Department of Natural Resources, the Environmental Quality Board, the Department of Transportation and Public Works, the Planning Board, and the University of Puerto Rico-Mayagüez, develop and implement a protocol for the mitigation of landslides. That same year on May 23rd, Law 69 was adopted ordering the Commonwealth Emergency Management Agency to coordinate an annual emergency evacuation drill program for all government agencies. Continuing with the allocation of responsibilities, in 2009 Law 35 and Law 134 required the Commonwealth Emergency Management Agency to create model evacuation plans for people with impairments and for multi-housing units structures.

Reading these laws and documents, it is as if they are fantasy documents Clarke (1999) described “fantasy documents” as those that are vague in terms of coordination but stress that the uncontrollable can be controlled. In paper a lot is going on and in reality changes are very slow and the processes and procedures detailed in those documents are often far from the praxis of emergency management and from the reality that external forces create during an event. Moreover, it often seems as if these fantastic documents would talk past each other about a change that is not understood. Although policy documents emphasize a shift from civil defense and emergency management, the concepts are still used interchangeably. For example, an official

video of the history of emergency management organization originally produced in the mid-80's and still in circulation uses the concepts of civil defense and emergency management interchangeably. Beyond those conceptual disjunctions, preparedness efforts are widely focused on the physical features of hazards and not on disaster prevention.

## **6.2 The Structure of Emergency Management in Puerto Rico**

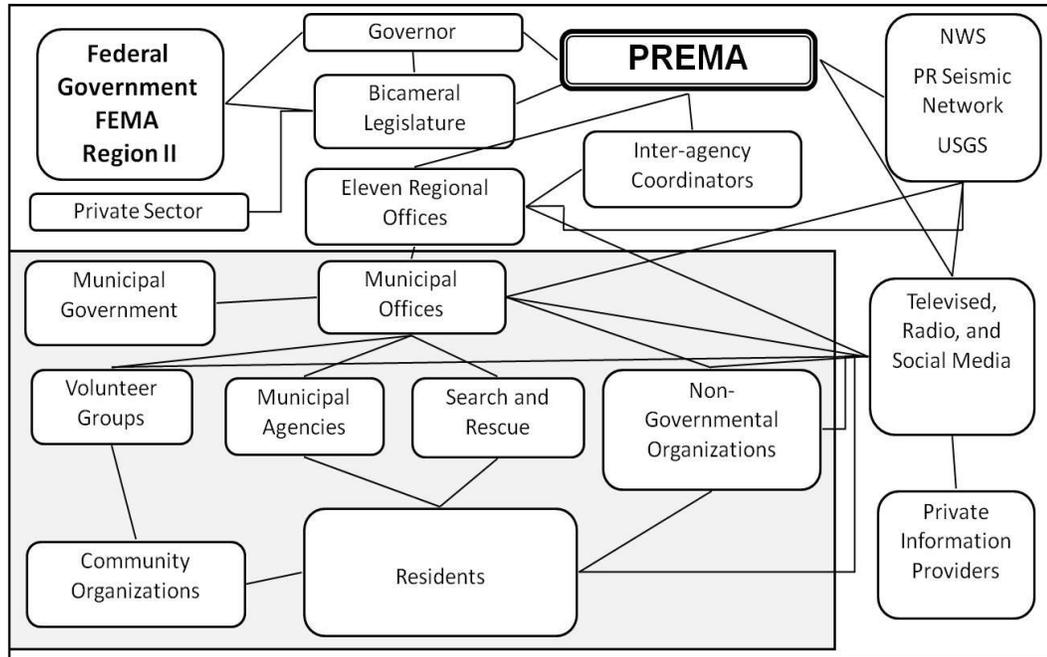
Max Weber (in Gerth and Write Mills, 1946) characterized modern bureaucracies as structures that a) have strict jurisdictional areas which are ordered by generally ordered by law 2) separate public resources from those of the person completing the duties associated to the employment, c) officials receive a salary to perform regular activities for those governed and those activities are distributed among bureaucrats using an official pre-established method, d) have the authority to give commands and that the power to do so is distributed in a hierarchical way with mechanisms of coercion available to officials to assure stability, e) have an established method to determine citizenship and to determine the qualifications that grant eligibility for employment in the bureaucracy, and lastly, as structures in which employment is long-term and secured.

However, with the increasing reliance on rational means, Weber also perceived the potential for irrationalization. Weber's perspective is valuable because although he questioned the rationalization of social action he did not argue that actions by bureaucrats were irrational. Rather, bureaucratic actions may be pursued through rational means and with good intentions, but their outcomes may be undesirable. In many ways the emergency management organization in Puerto Rico illustrates the characteristics of bureaucracy outlined by Weber. In this section I discuss some

structural conflicts that I identified in the practice of emergency management in Puerto Rico.

The Commonwealth Emergency Management Agency has offices at the municipal, regional, and state levels. At the federal level, the Puerto Rico State Emergency Management agency falls under Region II of the Federal Emergency Management Agency. Region II includes the states of New York, New Jersey, the unincorporated territory of Puerto Rico, and the Virgin Islands. Regional level offices are maintained by the state level office. The island is divided into eleven management regions. There are seventy-eight municipal emergency management offices. Responsibility over municipal level offices falls under the purview of each municipal government. The size of municipal offices varies from municipality to municipality. For the most part, at the very least each office has a director, a sub-director, and a secretary or communications officer. The position of the director is considered a political appointment designated by the municipality's major. Each major designates the day to day responsibilities of the municipal emergency management office. The major of each municipality also designates the funding and provides the emergency management resources for their jurisdiction. Figure 6.3 provides a diagram that shows the different stakeholders in the Puerto Rico emergency management system.

Figure 6.3: Puerto Rico Emergency Management System



### 6.3 Decision-Making: Conflict Structures in Emergency Management

As explained by emergency managers during the interview process, the State level EM office supports emergency management functions as needed but does not intervene in day to day emergency management practices at the municipal level. The central office also has limited power over decision making. For instance, the central office has limited power over what mitigation initiatives are implemented at the municipal level or what technology is used or acquired. Beyond the organizational limitations there are also infrastructure limitations. In addition to the limited budget that jurisdictions may have, the infrastructure necessary to adopt some of the technology suggested by the State EM office may not be available.

## **6.4 Political Shifts**

Although Puerto Rico is an unincorporated territory of the United States, it does not clearly align to political parties in the U.S. mainland. The three main political parties are the Commonwealth Party, the Pro-Statehood Party, and the Pro-Independence Party. Puerto Rico's politics are characterized by a bi-partisan control of power between the Pro-Statehood and the Commonwealth parties. One of the challenges expressed by emergency managers is that prior experience is not required to be appointed as emergency managers. Therefore, when one political party wins a jurisdiction the emergency manager director position is one of those appointments that can be filled by a person trusted by the incoming major. This practice is not limited to Puerto Rico; rather, political shifts impinge upon organizational learning in many other countries. Nevertheless, political shifts present challenges that should be examined and understood.

Emergency managers dedicate their careers to protect life and property. Sometimes they risk their lives to save others. As emergency management science and the emergency management profession has evolved and a great wealth of knowledge about the best practices to apply in different situations has also accumulated. Through the Federal Emergency Management Agency, Puerto Rican emergency managers attend courses at the Emergency Management Institute and at the National Fire Academy in Maryland. In addition, on a daily basis they gain knowledge about the communities in their jurisdiction. When those emergency managers are replaced by new political appointees, that knowledge and experience is lost. To examine whether a pattern of patronage was observed as some emergency managers claimed, all emergency management offices were called after the 2008 elections. A contact list prepared in 2007 was used as a baseline. From 2007 to 2009, there were changes in

the directorship of twenty eight municipal emergency management offices. Of the twenty eight municipalities in which a change in the directorship of the emergency management office is observed, nine also had changes in the political party in power. Of those nine municipalities in which there was a change in the political administration, seven also changed the emergency management director.

The practice of patronage has serious consequences even as it contributes to a growing bureaucracy. Moreover, patronage can affect organizational response (see Schneider (2005) for a discussion on patronage and emergency governance). For example, one of the participants in the study worked as an emergency management consultant for a municipal administration. Prior to this job, he was the emergency manager for that municipality. He was also actively engaged with volunteer groups as a trainer. The newly appointed emergency manager had some experience in some aspects of emergency management but was not as experienced as the emergency manager displaced. According to the displaced emergency manager, a few months later, he was called by the Mayor's office and offered a position as an emergency management consultant. His role is to provide advice to the Mayor on matters related to emergency management decision-making. In the event of an emergency, the consultant will provide advice to the Mayor and he will in turn coordinate with the newly appointed emergency manager.

Another way in which politics permeate emergency management is through the use of crisis situations as political opportunities. In the case of the 2009 explosion at a storage facility in Cataño, which I discuss in the next chapter, residents expressed that some politicians perceived the event as a political opportunity to gain public approval. Residents supported their claims by recounting how a Major from a neighboring

municipality contacted the community to ask for the number of kids to bring them a small gift and to coordinate an appropriate time for the activity. The Major's visit was also coordinated with the local media so that they would come to the community. Residents claimed that there were not enough gifts for all the kids even though they knew the number of kids that would come to the event. Another rumor among residents that emerged from the fieldwork in Cataño was that the governor used the event as a way to divert the attention from the termination of government employees as a way to balance and stabilize the local government budget.

## **6.5 Emergency Management and Policy Transfers**

Emergency management systems in advanced societies are often modeled by other societies interested in extending social protections to their citizens. Some of those respond to local needs, others to national concerns. According to emergency managers at all levels the most frequent event in Puerto Rico is flooding. However, preparedness efforts are heavily focused on tsunamis. One of the programs that were being implemented as I was doing field observations was the Tsunami Ready Program. The Tsunami Ready Program has been in place since 2000 and the number of jurisdictions participating in the program has more than doubled since the 2004 Indian Ocean Tsunami. The Tsunami Ready Program is part of the National Tsunami Hazard Mitigation Program. Tsunami Preparedness efforts are not completely new to Puerto Rico. Understanding the local risk to tsunamis has been a concern for local and international researchers for decades because Puerto Rico is located in an area of high seismic activity.

In Puerto Rico there are currently over 20 coastal municipalities recognized as Tsunami Ready. As specified by the Tsunami Ready Program guidelines, depending

on the size of the population served, a number of requisites must be met to be designated as a Tsunami Ready community. Standard requisites for all communities included: having a 24 hour warning point, an Emergency Operations Center (EOC), standard National Weather Service (NWS) specific area receivers in public facilities, establishing a communication network between communities and counties, designating safe zones and tsunami shelter areas, providing tsunami response materials to the public, encouraging hazard related curriculum at schools, having a tsunami hazard operations plan, holding a meeting between the National Weather Service office and the emergency manager in charge twice every year, and having an NWS official visit the community at least every other year. In terms of warning dissemination, the Tsunami Ready Program requires having one or more means to disseminate warning information, for example, sponsored program to distribute national weather radios (NWR), outdoor warning sirens, T.V. and radio overrides, phone messaging systems, and other locally controlled warning dissemination methods.

Government efforts are vital for disaster preparedness but they sometimes encounter challenges that can jeopardize the capacity of communities to fully benefit from these efforts. Understanding the needs of those we are trying to reach and how we may better empower them is vital for the effectiveness of preparedness efforts. Governments spend millions of tax dollars in programs aimed at increasing public awareness and promoting standard “all-hazards” emergency management skills and procedures. However, top down programs funded by the federal government sometimes ignore the needs of local communities. In Puerto Rico, the Tsunami Ready Program has provided an opportunity for increasing awareness about tsunamis and has

encouraged local jurisdictions to allocate resources for the purchase of equipment that can facilitate and enhance their capacity to reach their communities. One of such efforts has been the installation of outdoor warning sirens.

There are different types of outdoor warning systems that basically differentiate from each other based on whether they are mechanical, electromechanical, or electronic. The sounds emitted by different types of sirens depend on what type of siren it is (e.g. siren, whistle, horn, alarm, a voice message). More modern sirens have the capacity to broadcast voice messages. It is not surprising that modern siren systems often transmit messages in English, because sirens were first designed by the U.S. to warn the population of air raids during World War II and because these systems are now often designed in English-speaking countries for English-speaking markets. In some of the municipalities, voice sirens are being installed. Although English and Spanish are both official languages of Puerto Rico, most Puerto Ricans are not fully bilingual and would have difficulties understanding the message being broadcasted in English. In Puerto Rico over 95% of the population speaks Spanish as their first language and Spanish is the main language of instruction (U.S. Census, 2010).

Moreover, the challenges involved in the use of sirens have long been discussed (Lachman, et al., 1961; Lindell and Perry, 1987; Tierney, 1987; Aguirre, et al., 1991). When used for multiple hazards sirens may send a conflicting message (Donner, 2007). One of the challenges presented by the voice sirens being installed in Puerto Rico lays on the ability of residents to understand the warning message being broadcasted in English. Because of their voice messaging features, these sirens are more expensive. However, the public may not reap its benefits because they may not

understand the message. An example that can help us illustrate this challenge was observed during the 2012 LANTEX Tsunami Evacuation Exercise. LANTEX took place on March 28, 2012 at 9:04 AST. The U.S. National Weather Service-San Juan Forecast Office, in coordination with the National Tsunami Hazard Mitigation Program, the Puerto Rico Seismic Network, and the Caribbean Tsunami Center organized the exercise. LANTEX consisted of two scenarios: a 6.7 magnitude earthquake in the Gulf of Mexico that triggers a submarine slump and generates a tsunami, and, a 7.7 magnitude earthquake located east of South Carolina that triggers a slump along the continental slope and generates a tsunami.

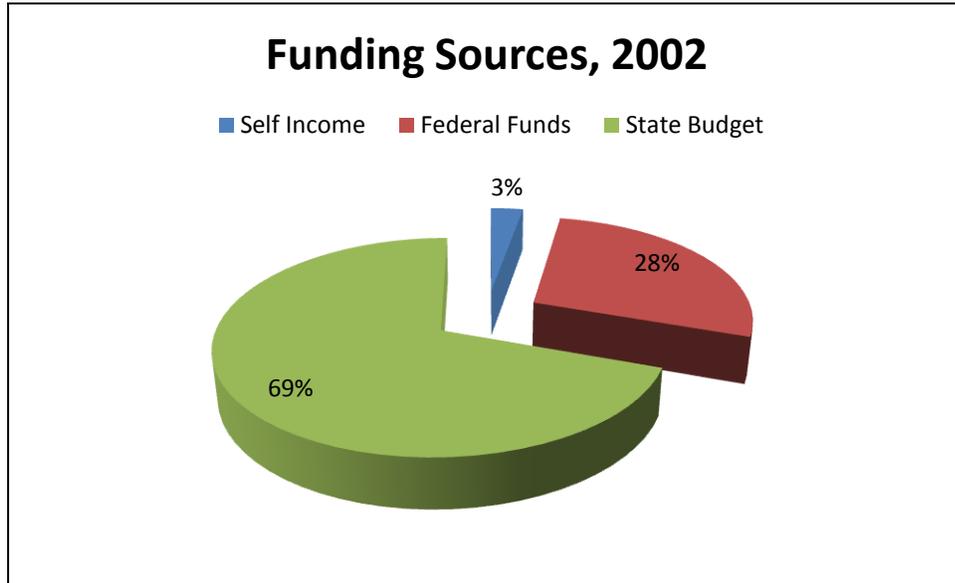
During that exercise, I was doing observations at a school located in the evacuation area. The warning emitted for the evacuation of that school during that exercise was for a shooting and requested immediate shelter. Although the protective action requested was shelter in place, students continued the evacuation. This observation exercise raises the question of whether automatic broadcasting sirens in English is the best suited technology to use in a warning system in the island. While other factors, including being aware of the exercise, make it difficult to determine that language was the only reason why students continued the evacuation process that may have been the case. When participants of the exercise were asked about whether they understood the message being transmitted they often claimed that they were just participating in the pre-planned exercise and that they did not understand the English message being transmitted through the loudspeakers. Although very well intentioned, top-down policy approaches where the public is seen as an audience to educate can be less effective and raise the need to better understand and integrate the population that they assist. In the next chapter I also present the findings of my research with

community leaders in Cataño. While that research is limited to those specific communities it sheds some light on the challenges that top down disaster reduction programs may encounter when dealing with marginalized communities.

## **6.6 Funding**

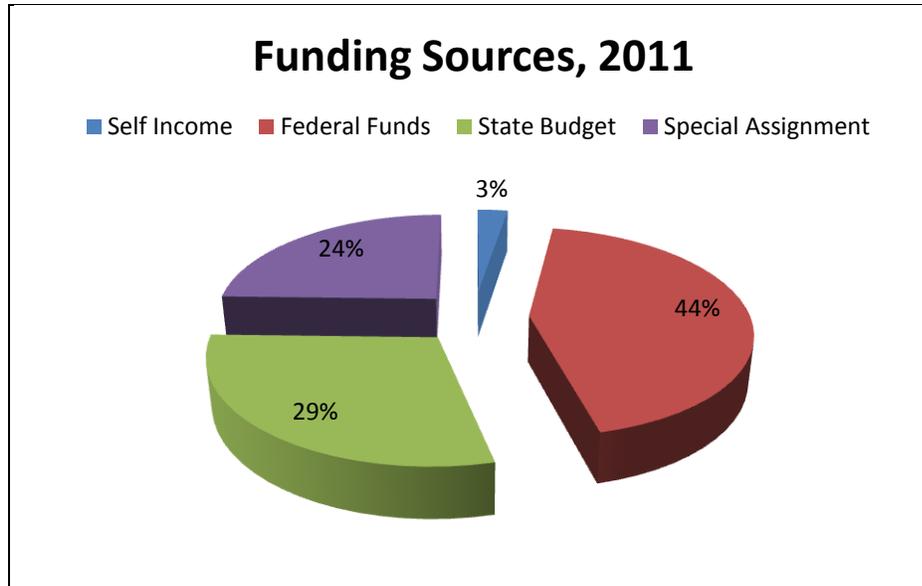
To some extent the Commonwealth Emergency Management has evolved parallel with U.S. emergency management policies. Because the agency receives funding from the federal government for several of its programs, the agency has had to conform to U.S. requirements. For example, the Commonwealth Emergency Management Agency budget is divided into three areas: general administration, emergency, crisis or disasters operations, and the 911 service. A decade ago, most of the funding for those programs, 69% was provided by the State budget and 3% was considered self-income generated through the 911 telephone service fees (see Figure 6.4). Only 28% of the funding was provided by federal funds.

Figure 6.4: Funding Sources in 2002



In contrast, 44% of the funds in the budget for fiscal year 2010-2011 were provided by federal programs (see Figure 6.5). Moreover, the funds to cover the 2008 budget were withdrawn from the Commonwealth Emergency Fund under the Puerto Rico Department of Treasury because the local government did not have the necessary funds. Federal programs providing the biggest contributions were Emergency Performance Grants, State Homeland Security Grants, Earthquake Consortium and State Assistant, and Citizens Corporation. The funds received are used for the emergency, crisis or disasters program.

Figure 6.5: Funding Sources in 2011



The 2010-2011 budget report for the Commonwealth Emergency Management Agency points out that a reduction in State funding is mainly due to the measures implemented for the reduction and control of public expenditure.

## 6.7 Summary

In the last seventy years, the Commonwealth Emergency Management Organization has evolved from a dependency under the governor's office to a large and complex bureaucracy. Through its evolution, the Puerto Rico Emergency Management Agency has enhanced and extended the services provided to the public. Emergency management procedures are increasingly standardized with the use of plans that outline roles, functions, and responsibilities. The emergency management organization also has more control over actions related to emergency management through laws that impose emergency management units in all agencies. Although

many challenges remain in terms of access to data, the organization is increasingly using computerized systems to manage incidents and emergencies. There are also programs, such as the Community Emergency Response Teams, that provide training to communities and volunteers interested in disaster response.

Nevertheless, as the emergency management bureaucracy continues to evolve, challenges remain so that it could maximize its potential as the technically superior form of social organization. While national programs can enhance emergency management capacities they cannot replace local emergency management efforts. Participating in federal programs should boost the capacity of the organization to mitigate, prepare, respond, and recover. When intervention from the state is needed, local emergency managers every effort should be made so that they can remain visible to the community to provide residents with a sense of continuity. Although the organization is increasingly adopting new emergency management technologies, the effectiveness of those technologies needs to be evaluated in more detail. Moreover, an integrated system through with agencies that have any emergency management could share files would facilitate collaboration and could allow them to have a more concerted response. Lastly, while the agency greatly benefits from federal funding it is imperative and urgent for it to identify other ways to be financially self-sufficient. Future research will explore whether the need to match funds received through federal program hampers the capacity of the local organization to designate funds for local programs. In the next chapter, I present a case study that contrasts emergency management efforts with social vulnerability at the community level.

## **Chapter 7**

### **DEVELOPMENT, RISK, SOCIAL VULNERABILITY TO DISASTERS, AND EMERGENCY MANAGEMENT IN CATAÑO, PUERTO RICO**

Scholars within the social vulnerability perspective extend their analysis beyond the mitigation, preparedness, response, and recovery phases defined in emergency management. This dissertation builds on the social vulnerability approach to understand disasters as social processes rooted in pre-existing social structures and social arrangements. This chapter adopts an evolutionary approach to frame contemporary social vulnerability within a historical social context. The chapter presents an overview of the evolution of the municipality of Cataño, its inhabitants, how the site has become a place where risk intersects with social vulnerability, and some of the ways in which, through interactions, social vulnerability may be reproduced.

Bankoff (2004) argues that disaster researchers have often underestimated the temporal dimension of disasters and vulnerability. Researchers within the social vulnerability paradigm have studied disasters within an ecological perspective that focuses more strongly on the relationship between humans and the environment. Anthony Oliver-Smith provides a definition of disasters that gives attention to the temporal dimension of disaster events. In the seminal book 'What is a disaster? Perspectives on the Question' (1998) edited by E.L. Quarantelli, Oliver-Smith defined disasters as:

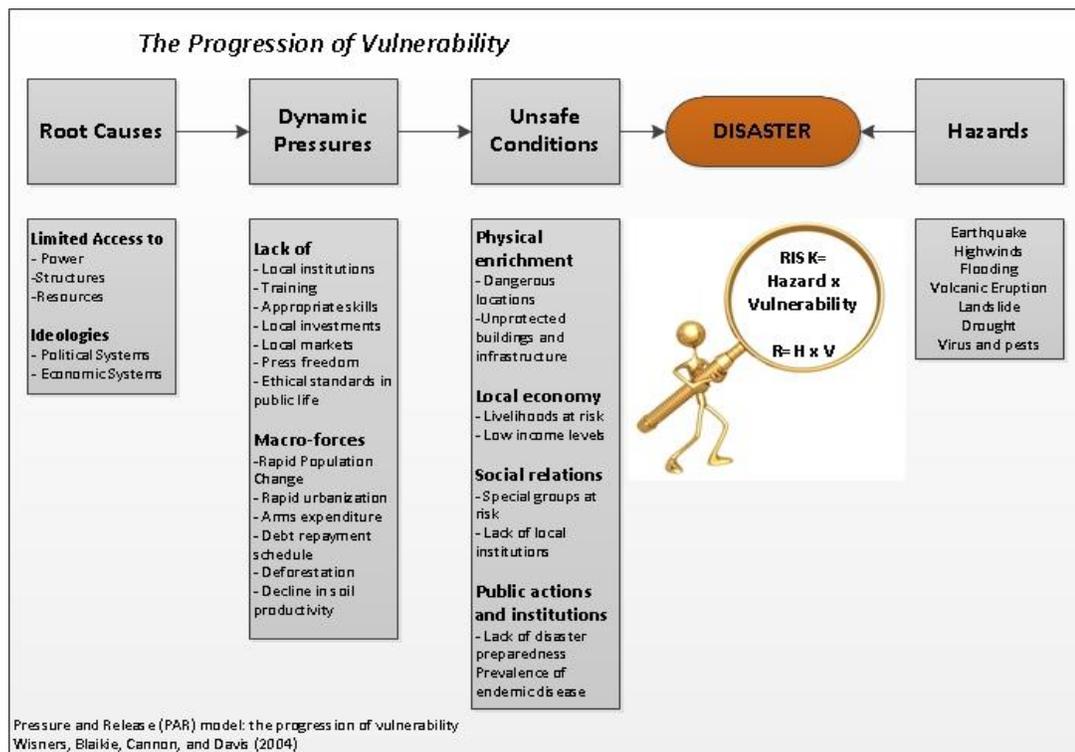
“ a process/event involving the combination of a potentially destructive agent(s) from the natural, modified, and/or constructed environment and a population in a socially produced condition of vulnerability, resulting in a perceived disruption of the customary relative satisfactions of individual and social needs for physical survival, social order and meaning.”

Oliver Smith (1999:186) also contends that disasters do not happen in nature “but societies are in nature themselves and that mutually constitutive relationship is not simply given, but is an active, evolving set of interactive processes.” It is within the evolutionary relationship between humans and the environment that social life is structured and through which a condition of vulnerability may be produced. Therefore, understanding the explosion at a fuel storage facility in Cataño in 2009 as an evolutionary relationship between humans and the environment is very valuable to understanding how social vulnerability is reproduced. To do so we must integrate multiple perspectives to gain a more comprehensive understanding of how social relationships may inform disaster outcomes. Oliver-Smith (2009) contends that vulnerability “involves the totality of relationships in a given social situation producing a set of conditions that render a society unable to absorb the impacts of natural or social agents without significant disruption of its capacity to fulfill the basic needs of its members.” Disasters may not only be a risk experienced by societies but rather serve as “sensitizing” events that bring to light problematic social arrangements that often go unnoticed (Nigg and Mileti, 2002).

The Pressure and Release Model (PAR) developed by Wisner and his colleagues (2004) seeks to capture the progression of social vulnerability. According to the PAR model the risk of a disaster emerges from the intersection of social and natural forces (see Figure 7.1). Disasters, according to the PAR model, are better explained as a chain of social processes that begin with root causes located at the

macro level or in past history. Root causes reflect the dynamics and distribution of power in a society (Wisner, et al., 2004:52). Root causes connect with what the PAR model refers to as dynamic pressures, which are processes or actions that create unsafe conditions that can result in a disaster.

Figure 7.1: Wisner's Pressure and Release Model



Some challenges faced by the PAR model are: a) considering interactions at much lower levels, b) accounting for the human/environment relationship, and c) capturing the spatial dimension and the use of space. First, the PAR model departs from a perspective focused on access, locates the root causes of vulnerability at the macro level, and does not provide a clear view of how interactions inform social vulnerability. Having access to social resources does not fully explain the complexity

of social vulnerability. To better understand social vulnerability we must seek to understand how social relationships may structure access. Secondly, the PAR model does not examine how the environment is treated by societies; whether the environment is treated as a resource to be exploited or used sustainably. Thirdly, the PAR model is imprecise when it comes to the spatial features of disasters. The model does not take into account spatial dynamics, such as proximity to the hazard (Cutter, 2009). Moreover, because of its broad scope it does not consider interactions among jurisdiction or the relative effects of vulnerability within a community.

The first part of this chapter presents a case study that focuses on the evolution of social arrangements and risks in the municipality of Cataño. The second part presents the findings of research on community response following the explosion of the Caribbean Petroleum Corporation fuel storage depot on October 23, 2009. The chapter aims to provide a better understanding of how changes in economic opportunities, combined with shifts in the use of the land, and changes in social arrangements have resulted in a “condition” of social vulnerability. Through my research in Cataño, I sought to bring together organizational and community elements to allow a more dynamic, participatory, and comprehensive understanding of social vulnerability to disaster. The social vulnerability paradigm has been repeatedly critiqued for framing social actors as being passive. However, disasters are fundamentally social processes. The social arrangements in which disasters unfold are reproduced by diverse social actors occupying different positions in the social system (Hilhorst, 2003). Extending static taxonomic approaches to focus on emergency management and community relationships provides a more nuanced understanding of the dynamics of social vulnerability to disasters (Paton and Johnston, 2001).

I use Cataño as an example to provide an in depth study of the evolution of risk and social vulnerability in a location.

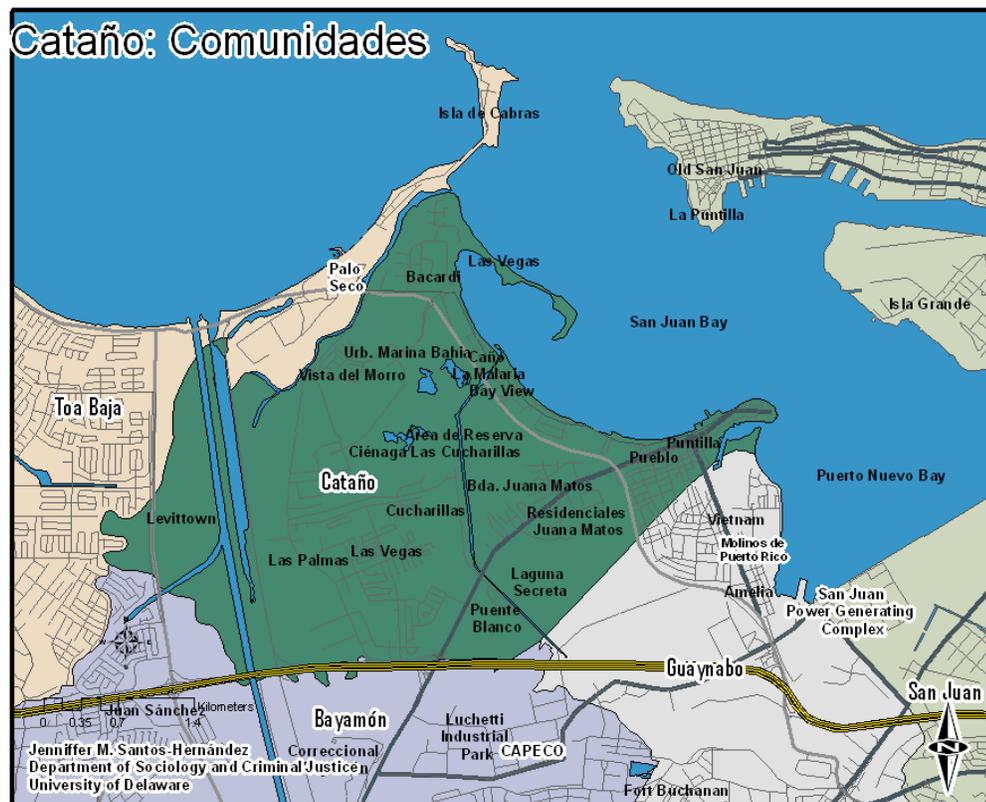
## **7.1 Field and Archival Research**

I started my research in Cataño on December of 2009; about five weeks after an explosion caused a fire that consumed twenty one of the forty fuel tanks at the Caribbean Petroleum Corporation (CAPECO). I was interested in learning more about the emergency that had taken place there on October 23, 2009. During that winter, I was doing field research in Puerto Rico. I was conducting interviews focused on understanding the organizational structure of emergency management in Puerto Rico. More specifically, I was studying the characteristics, skills, and preferences of users of severe weather data and technology for decision-making. I also sought to understand how emergency managers supported their daily activities.

The fire emergency caused by the explosion at the Caribbean Petroleum Corporation facility emerged in several discussions, perhaps because it was a recent incident and one of Puerto Rico's biggest environmental emergencies. For the most part, the incident was mentioned when talking about large scale events or interagency coordination. The event was mentioned as an example of the increasing professionalization of emergency management, of interagency coordination, and as an example of the reduction in response time. Some participants of the interviews with emergency management personnel mentioned that it was difficult to reach residents of the communities near the fuel storage facility. For example, an emergency manager said that they did not feel welcome in the communities and that they were concerned about criminal activity in the area. Those responses sparked my interest on social vulnerability in marginal communities.

The communities closest to the fuel storage facility in Cataño are known as Puente Blanco, Juana Matos, and Cucharillas. During that trip I made my first visit to the municipality of Cataño and the Luchetti Industrial Park. The Luchetti Industrial park is located within the county line of the municipality of Bayamon. Map 2 shows the main communities in Cataño and their location relative to the Luchetti Industrial Park.

Figure 7.2: Map of Communities in Cataño



Cataño is located in the metropolitan area of San Juan. When I began doing research in Cataño, I had very little knowledge about the municipality. I grew up in the municipality of Isabela, which is located in the northwest coast of Puerto Rico; about 90 minutes from Cataño. Prior to visiting the municipality, I collected a number of reports about the event and other literature focused on environmental problems affecting the municipality. As I was doing my research, I identified other contacts that were also very important to gain access to the communities that were most affected by the explosion. First, I knew a graduate student in epidemiology that was working in a project on the incidence of respiratory diseases in the municipality. He gave me information for initial contacts. Then, I found out that one of the monasteries in the municipality belonged to the same religious order that administered the high school from which I graduated. They also provided me with additional information and several contacts.

During the last three years, I visited the municipality every three to four months. During my visits, I held interactive interviews with local residents. Conversations focused on “what happened the night of the explosion and how things were going after the explosion”. Some of the people I talked to were actively involved with non-governmental and religious organizations in Cataño and served as key informants (see Chapter 3). My conversations with residents were informal and included anyone who would talk to me in the “plaza”, at one of the community centers, at a church, or at a street vendor stand, among others. We would talk about the community, about how long they have been there, about environmental problems in Cataño, and about the reconstruction of the fuel storage facility. I would use my visits to the community to gain a better understanding of what I was finding in the analysis

of field notes and through the review of historical documents about the communities. The topic of the fuel storage facility and environmental problems seemed to be part of the daily conversations of Cataño residents. I also had conversations with local officials about the emergency. Local officials seemed hesitant to talk about the local response to the event because it was managed by the State EM office. Some of them were more open to talk about the event and I was able to integrate their perspectives. In addition to my fieldwork, I consulted book chapters, peer-reviewed articles, reports, legal documents, and pictures.

## **7.2 How the Municipality of Cataño Emerged and Evolved?**

Although Cataño is the smallest municipality of San Juan, it occupies a very important place in the history of Puerto Rico's development. The municipality of Cataño is located across the San Juan Bay in the port area with the highest economic activity in Puerto Rico (see Map 3). What is known as Cataño today used to be a barrio or subdivision of the larger neighboring municipality called Bayamón.

The land where Cataño is located was given in 1569 by the insular government to a man named Hernando de Cataño. He was the second medical doctor that was brought from Spain to offer services in Puerto Rico. During the 17th century, the area closer to the Bayamón River was known as Punta de Cataño and it was used as agricultural land. Punta de Cataño offered the fastest and main access route from Bayamón to the San Juan Bay. People coming from the interior mountainous region of the island would come to Punta de Cataño seeking jobs at the loading dock. The area was also a breeding site for horses that were used to travel to other parts of the island. By the end of the 19th century, although Punta de Cataño was still part of the municipality of Bayamón, it had a separate Catholic parish acknowledged by the

bishop of Puerto Rico, Juan Antonio Puig. See Figure 7.4 for an image of the ruins of the Punta de Cataño Parish.

In 1853, a new dock was built in the area closer to La Puntilla, and passenger transportation services from Cataño to San Juan started to be offered (see Figure 7.3). The area of what is today Cataño was a swamp covered mostly by mangroves. According to Spain’s Legislative Documents Collection, on July, 11, 1873, Francisco Pi y Margall, president of the First Spanish Republic, authorized Manuel Adell “to clean and take advantage” of the mangrove area along the coast. Ownership over a piece of land that was already “cleaned” was also transferred (Colección Legislativa de España, Volume 111, Page 43). The area was named Hato de Las Palmas de Cataño.

Figure 7.3: Map of Cataño and San Juan Metropolitan Area

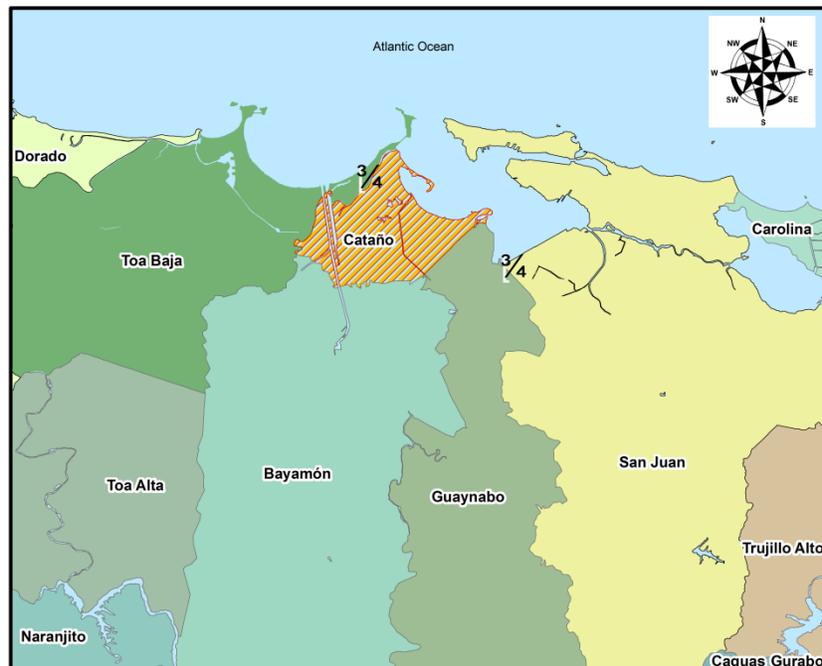


Figure 7.4: Picture of the Punta de Cataño Parish Ruins



In 1882 a tramway, La Línea Férrea del Oeste (The Western Rail), was inaugurated. The new rail, along with the maritime transportation service, completed the first transportation system between Bayamón, Cataño, and San Juan. Migrants from the interior part of the island and residents of neighboring Palo Seco could obtain a piece of land for a small amount of money to build their houses along the rail line. An additional piece of land, over 10,000 square meters, was dried out to build an oil refinery named West Indian Oil Refine Company.

Residents of the area wanted to become an independent municipality, but Bayamón denied their petition several times. The area was one of the most active ones in Bayamón and it was attractive because of its direct access to the San Juan bay. Residents expressed their desire to separate from Bayamón to the insular government several times and in 1927 Cataño was granted its independence. At the time, the new

town had five industries including a tobacco factory, a fruit packing company, a wood warehouse, the oil refinery, and the dock or varadero.

### **7.3 Cataño During the 1930s Economic Crisis**

As time passed, larger squatter settlements or “arrabales” developed. The economic crisis of the 1930s presented many challenges for Puerto Ricans. Emigration to the United States mainland and migration to urban centers were some of the adaptations of the impoverished rural and landless population to secure a livelihood. One of the main reasons why there was such a large landless population in Puerto Rico was the absence of a mechanism to manage the control and use of land prior to the establishment of the Land Authority in 1941. The lack of such mechanism had allowed the concentration of the more fertile land in the hands of a few privileged families. The 1941 Land Law limited the amount of land that could be owned by a corporation to five hundred acres. The law represents the reformation of the agricultural sector in Puerto Rico. According to historian Francisco Scarano (2002) the expropriated land was to be distributed in lots with an area of one to three acres that would be referred to as “parcelas” (parcels), in bigger lots that ranged from five to twenty five acres referred to as “fincas familiares” (family farms), and in larger lots that ranged from one to five hundred acres known as “fincas de beneficio personal” (proportional benefit lots). This arrangement allowed many families living in rural areas to obtain ownership over small pieces of land where they could build their houses but did not solve the demand for housing in the growing urban areas (García-Colón, 2009). The squatter settlements in Cataño continued growing.

During the economic crisis of the 1930s many agricultural workers moved to Cataño in an attempt to improve their living conditions. As part of the New Deal

several initiatives were being implemented in urbanizing areas to foment economic activity. The New Deal was a series of economic programs created by Congress in response to the Great Depression. The new industries that emerged in Cataño during that time attracted displaced workers from the decaying coffee industry and others that were trying to improve their living conditions. Ramirez (1978) found that 63.6% of the residents of Cataño at the time of his study had been born in rural areas, illustrating the migratory pattern from rural areas to Cataño. The lack of housing to absorb the incoming population led to the formation of the first squatter settlements.

The decade of the 1940s was crucial for the development of Puerto Rico's government bureaucracy. Cataño was at the heart of all these bureaucratic changes. The Puerto Rico Planning Board was established in 1942 and tasked with the development of a master plan for the island. The Compañía de Fomento Industrial (Puerto Rico Development Company) and the Banco Gubernamental de Desarrollo (Puerto Rico Development Bank) were created in 1942. The main objective of Fomento was to develop the infrastructure that was perceived as necessary to take advantage of the raw materials and resources that were available in the island. Between 1941 and 1945 eleven public corporations were established, including transportation, communication, and industrial and agricultural development, housing, and credit (Funkhouser and González, 1980). The first companies developed by Fomento operated in the municipality of Cataño. In 1936 the first non-agricultural heavy industry in Puerto Rico, a cement plant, was inaugurated in Cataño (Maldonado, 1997). Another industry that was created by the government during those years was a glass company for the purpose of producing bottles for the rum industry.

#### **7.4 Defending the Empire: Military Bases and Land Transformation**

Simultaneous to the development of Puerto Rico, the United States was entering into another armed conflict and the island housed several important military posts. As a consequence, the military became an important source of employment. To the south of Cataño is located Fort Buchanan, named after the first colonel of the “United States Army Porto Rico Regiment of Infantry” which was created in 1901. The military base was established in 1923 as Camp Buchanan and served as a training facility for the Army and National Guard. During World War II, Fort Buchanan also served as a depot and troops replacement center. The military base had a rail that connected the military complex to the bay of San Juan from where soldiers for World War II and Korea were deployed (U.S. Army Installation Management Command, 2012). During the 1920s and 1930s the military base was also a source of employment because it offered construction jobs for agricultural workers coming from the mountainous region. In addition to the employment offered, the presence of the military also facilitated some of the changes in the region. In the 1950s they built a marsh, known as La Malaria marsh and further channeled the Bayamón River. The La Malaria marsh, also known as the San Fernando marsh, was originally built to collect wastewater coming from Fort Buchanan. The U.S. Army also took a lead of filling and drying out the mangrove area. The goal for filling a portion of the land was to build an aircraft runway that would be closer to the military base. The project was abandoned because it became evident that the terrain could not absorb the pressure of landing aircrafts. These construction projects also offered job opportunities.

## **7.5 The Modernization of Manufacturing and Energy Sources**

In the 1950s several other large industries opened in the metropolitan area. During the opening of the Palo Seco Power Plant in Cataño, Governor Muñoz Marín claimed during his message that a new industrial plant was opened in Puerto Rico every nine days. These industries were accommodated by Fomento Industrial. Some of the industries close to Cataño include the Puerto Rico Mills Corporation (Molinos de Puerto Rico), inaugurated in 1959, and a tile factory. The main objective of Fomento was to develop the infrastructure that was perceived as necessary to take advantage of the raw materials and resources that were available in the island. However, during the second phase of Operation Bootstrap the Puerto Rico Development Corporation became interested in the oil industry. With the creation of these factories, and the intention to further industrialize the island, a perceived need to extend beyond the hydroelectric system also emerged. There was also a proposal to generate and sell energy to other smaller islands in the Caribbean. Although activists and specialists argue that enough energy was produced to meet the needs of the island, the production of energy moved from renewable to non-renewable sources (Meyn, 1996). All these changes contributed to the environmental degradation of the region.

During the 1950s and 1960s several other economic development initiatives were launched. Some of those included large construction and land transformation projects. During that decade, the natural hydrological system in the area was transformed. The Bayamón River was channeled to reduce the accumulation of water inland. Channeling the Bayamón River increased the availability of land in Cataño. Among several effects, the land along the river started losing its agricultural value because it was no longer as fertile. Marine life was also affected by the contaminated waters and sediments flowing more easily into the sea. The area that was cleared was

quickly occupied because of the high demand for housing in the Metropolitan Area. A pump system was also installed to drain the La Malaria creek, drain the swamps, and reduce the risk of flooding and tropical diseases in Juana Matos, Las Cucharillas, and Puente Blanco.

During the industrial transformation years, the Juana Matos settlement was the largest “arrabal” in Cataño. The community carries the name of one of its early settlers who had a “fry corner” store. In Figure 7.5, obtained from the Digital Archive of the University of Puerto Rico-Río Piedras, the adaptation of residents to the characteristics of the land and their housing settlements can be observed.

Figure 7.5: Picture of Squatter Settlement in Cataño



Source: University of Puerto Rico Digital Archive

According to residents, the local government was not able to prevent the settlement of people in the region for decades. Second and third generation residents

narrate that, according to their parents and grandparents, the Police would sporadically come to the neighborhoods and destroy any construction that was in progress.

However, if the house had had a roof or a fence around the lot, government officials could not destroy the construction or evict the residents. Squatters whose houses were destroyed would try to rebuild in the same piece of land as quickly as possible so that they could not be forced out of the communities during the next Police visit.

Government officials could also do little about further construction within a lot and as time passed, additional units were built in each lot. The images on Figure 7.6 show the Juana Matos community at the end of the 1960s.

## **7.6 Housing Projects**

One of the strategies to meet the demand for housing was the construction of housing projects. Close to 60% of the housing units in Cataño were built in a 30-year period between 1950 and 1979. In Puerto Rico housing projects were one of the programs sponsored by the Puerto Rican Emergency Relief Agency (PRERA); which was also part of the New Deal initiatives implemented in the island (see Alameda and Rivera, 2005). The idea of projects was to provide people with low cost housing until they were able to afford a single family home, particularly through government assisted home owner loans. The first housing project was opened in 1937 in San Juan and was named Falansterio (a model of a self-sufficient community theorized by French socialist Charles Fourier). The first housing project in Cataño was the Rosendo Matienzo Cintrón Housing Project inaugurated in 1946 (see Figure 7.7). This housing development project had 15 buildings. Since the 1960s several other housing projects were built in Cataño including Juana Matos II in 1966 (see Figure 7.8), Juana Matos I in 1967, Las Palmas in 1968, Juana Matos III in 1970, Jardines de Cataño in 1971, and

more recently, El Coquí, inaugurated in 1983. However, it seems that the goal of transitioning into a single family dwelling has been unattainable or has vanished. Temporary housing projects, not only in Cataño but in Puerto Rico, are predominantly occupied by long standing residents (Dinzey-Flores, 2007).

Figure 7.6: Picture of Barriada Juana Matos



Figure 7.7: Picture of Matienzo Cintrón Housing Project - Oldest Housing Project in Cataño



Figure 7.8: Picture of a Building at Juana Matos II Housing Project



## 7.7 Flooding

Although a draining system was installed in the 1950s and revamped in the 1990s, Cataño presents a high risk of flooding. The municipality is located along the coast and its land is highly saturated with water. The communities of Juana Matos, Puente Blanco, and Cucharillas are located within the flood-plain. There is discrepancy between the FEMA flood designations and those of the local planning board. Future research could explore those differences. A quick view of the flood maps suggests that FEMA's designations categorize a larger high risk area than the local planning board.

## **7.8 Industrial Activity and Environmental Struggle**

Cataño is a site of heavy industrial and polluting activities. There are two thermoelectric power plants, one located by the border with San Juan, and another one close to the border with Toa Baja. There is a sewage incinerator, several waste management facilities, and the headquarters of the Bacardi Rum distillery. Because of its convenient location with access to the coast, there is a lot of commercial traffic in the area. There are also several storage facilities that are used by companies to store goods to be distributed or exported (Aristizabal, et al., 2005). Over time, several environmental groups have emerged in response to the environmental degradation in the region. After being ignored by the local government, in the 1970s organized Cataño residents submitted a series of formal air quality complaints to the U.S. Environmental Protection Agency. In 1973 the Puerto Rico Environmental Quality Board identified the power generating complexes, the Caribbean Petroleum Corporation, and Puerto Rico Glass Corporation as the main sources of air pollution. At the time the Caribbean Petroleum Corporation was financially unstable. The local government assisted the corporation with tax breaks in several occasions.

The main contaminants identified in Cataño were sulfur dioxide, nitrogen dioxide, particulate, soot, and dust. Muñoz Vázquez and Ortega Cález (1998) observed that initial discussions were focused on the use of science and on evaluating the methods employed to examine air quality. However, although environmental problems were identified, government actions were insufficient. A lack of government pressure to alleviate industrial pollution has been the norm. Concepción (1990) examined the politics of environmental regulation in Puerto Rico. Her research shows how environmental regulation was seen as counterproductive for the industrialization of Puerto Rico. More specifically, Concepción shows how the local government adopted

the use of environmental impact assessments, as required by the federal government, even as the policy was rarely enforced.

In the 1990s a major lawsuit was filed to force the Puerto Rico Electric Power Authority to meet federal air quality standards. Although the residents complained about respiratory, skin, and cancer problems, the Puerto Rico Electric Power Authority was hesitant to accept that the health problems affecting the residents were related to the toxic emissions of sulfur dioxide into the atmosphere generated by the two facilities located on each side of the municipality. Research from the Puerto Rican Medical Association and from the U.S. Department of Health evidenced the adverse effects of long term exposure to sulfur dioxide (see also, Bertran, Canabal, et al, 2010; and Loyo-Berrios, 2007). In response to research findings, the EPA launched an investigation and found that the emissions being released by the power plants were not in compliance with federal air quality standards. The Puerto Rico Electric Power Authority was subsequently fined and forced to use more refined crude that is less toxic.

## **7.9 Current Demographic and Socio-Economic Characteristics**

As of today, Cataño is made of two barrios or subdivisions and fourteen main communities, including the downtown area, public housing projects, housing developments, several working class neighborhoods, and a few gated communities. According to the 2010 U.S. Census Summary File 1, 28,140 people were living in 10,108 households in the municipality of Cataño. Since the 1970s Cataño has encountered many difficulties to meet the air quality standards established by federal law. Part of the problem is the fact that many industries are located in the border region with other municipalities creating jurisdictional challenges.

In terms of economic opportunities, although at the heart of the industrialization of Puerto Rico, Cataño has one of the lowest median incomes in the island. The median household income is \$17,045 and about 42% of the households received food stamps or supplemental nutrition assistance benefits in 2009. In the last two decades a shift has been observed in terms of housing for occupants are increasingly renters, a pattern that could be explored in future research. Access to healthcare corresponds to the economic outlook of the municipality. About 64% of the total population rely on public health insurance coverage or have no health insurance. Over 66% of the families have children less than five years old and close to half of the population 65 years and over live below the poverty level. In the downtown area, over 60% of the residents are living below the poverty level (Puerto Rico Planning Board, 2007). About 40% of the population 25 years and over have not completed high school. The pattern of low education is stronger in the downtown area where 55% of the residents have not completed high school.

The age distribution of the population in the municipality is similar to the patterns observed for Puerto Rico. Approximately 21% of those living in the municipality of Cataño are children under the age of fourteen. According to the 2010 American Community Survey only 54% of the population between the ages of 16 and over is in the labor force. Of those in the labor force, about 14% are unemployed. Besides the prevalence of industrial facilities, the main sectors providing employment to those in the labor force are educational services, health care and social assistance (19.9%), retail trade industry (15.4%), finance, insurance, and real estate industries (10.7%), and the scientific and waste management services industries (10.0%). The

public sector has long served as a main employer absorbing over 18% of the local labor force.

### **7.10 The Caribbean Petroleum Corporation**

CAPECO was established in 1955 as a refinery that was to provide fuel for the Puerto Rico Electric Power Authority. The facility is located in the municipality of Bayamón by the Jose De Diego expressway and road PR-28 in the Antonio Luchetti Industrial Park, named after the first director of the Puerto Rico Power Company. The industrial area was evacuated and all surrounding roads, including a portion of the island's main highway that runs nearby, were closed. Only emergency personnel and those evacuating the area were allowed in the perimeter. The fire took Puerto Rico and U.S. firefighters two days to extinguish.

Since its creation the Caribbean Petroleum Corporation has experienced many shifts in administration. In 1962 the corporation was purchased by Gulf Oil Corporation and the site was renamed to Caribbean Gulf Refining Corporation. In 1984 Chevron Corporation purchased the Gulf Oil Refining Corporation. In 1987 the site was renamed to the Caribbean Petroleum Corporation (CAPECO). As we discussed earlier since the 1970s the company has been accused of numerous infringements of environmental laws, particularly violations to the Resource Conservation and Recovery Act, to the Clean Water Act, and to the Clean Air Act. After long standing legal battles, in 1996 the company agreed to reduce soil and water contamination at the facility. However, in 1998 the company was again fined after Hurricane Georges for violations to the Clean Water Act. The company failed to pay some of the fines and was referred by the EPA to the U.S. Department of Justice. In 2001 the company filed for bankruptcy in the U.S. Bankruptcy Court District of

Delaware. The company was again cited by the EPA in 2007 for violations to the Clean Air Act. Following the explosion, in 2010, CAPECO filed a Chapter 11 bankruptcy petition in the Court of Delaware to liquidate all its assets, including the fuel storage facility and 127 service stations throughout the island. However, filing for bankruptcy did not end the liability of CAPECO. The U.S. Department of Justice received proofs of claim against CAPECO in their bankruptcy proceeding and the corporation is forced to pay \$8.2 million dollars to the Environmental Protection Agency for the management and cleanup of over 30 million gallons of petroleum that were released the day of the explosion. As part of the bankruptcy process Puma Energy acquired all the assets owned by CAPECO for eighty-two million dollars. The facility is now owned by PUMA Energy Caribe, a subsidiary of Puma Energy International. Although this new company is working with federal and local authorities in cleaning and restoring the facility, legal actions for environmental pollution have been taken against the company in other countries (e.g. Côte d' Ivoire and Netherlands) and the final result of the cleanup process is yet to be seen.

Figure 7.9: Picture of the Fuel Pipeline that connects the Puma Fuel Storage to the Power Generating Facilities



Figure 7.10: Fuel Storage Facility Fire



Source: El Nuevo Día Newspaper

Figure 7.11: Aerial View of CAPECO Storage Facility



### 7.11 The CAPECO Explosion

On October 23, 2009 at 12:14 am there was a large explosion and a fire at the Caribbean Petroleum Corporation. Out of the forty fuel tanks at the facility, the fire destroyed fifteen and damaged seventeen. According to the Puerto Rico Seismic Network the explosion released energy comparable to a micro seism of magnitude 2.8 in the Richter scale and was detected by seismic stations as far as St. Thomas. According to residents of the communities nearby the explosions were felt very strongly. Some describe it as “un estruendo” (roar) that woke them up. Some residents described it as an experience that made them believe that the world was ending that night. Residents say they were not able to recognize what had happened but that a bright light, the vibration, and pieces of glass from shattered windows woke them up

and that they felt very scared. One of the rumors that emerged was that an airplane had crashed in the region. In Puente Blanco and in Parcelas Juana Matos, the communities closest to the fuel storage facility, some houses had damage to roofs, walls, and windows that required considerable repairs.

### **7.12 Emergency Response**

According to residents of Puente Blanco, the emergency management organization and other public safety organizations quickly arrived. According to official reports the evacuation of residents started within the first hour after the explosion. Over 600 residents were evacuated from the neighborhood. Residents of Puente Blanco and Las Cucharillas explained that in the beginning they didn't know where they had to go and that they just evacuated their houses. They described it as an expansive orange wave entering their homes that destroyed windows, doors, roofs, and even affected the foundation of some homes. The immediate evacuation was facilitated mainly by community leaders. In Puente Blanco, residents expressed that a resident of the community who is a police officer played a leading role in the immediate evacuation of residents.

Although the local emergency management office has an evacuation plan that includes the communities surrounding the fuel storage facility, residents said that they did not know what they were supposed to do. This feeling of uncertainty contrasts with the descriptions provided by local emergency management personnel. Because of the size of the explosion the emergency was overtaken by the EM central office and the National Guard. Local officials said that after the intervention of the EM central office, the role of municipal officials was often one of information provider. Residents said that local officials were only seen in the community for a short period of time

during the beginning of the emergency response. Perhaps this is because officials were involved in other activities.

However, the limited interaction with emergency management officials contrasts with the continuous relationship of community organizations with residents. At the same time there seems to be little collaboration between community organizations and the emergency management organization. When talking to some of the residents to learn more about their communities, I found out that many of them volunteer with different federal, state, and local government organizations. For example, “Corredor Del Yaguazo” (Yaguazo Corridor) is a community organization that serves as a liaison to collect samples of the Las Cucharillas Marsh for the U.S. Environmental Protection Agency. Other community groups are engaged with academic institutions conducting research in the area. These pre-existing arrangements present an unexplored opportunity to promote community preparedness and to increase the capacity of residents to act as first responders during an emergency.

There is minimal interaction between the emergency management organization and the communities, which complicates the situation. For instance, although the municipality is surrounded by a partially underground pipeline system for fuel, the vast majority of the residents mentioned not knowing the evacuation plan. In an emergency involving the underground pipeline system, evacuating the residents of local communities could be very difficult. There are 30,000 residents in the area and that number does not reflect what geographers call the ambient population who are people that are in the municipality at different times of the day.

### **7.13 Limited Community Information**

Another challenge that was brought to bear after the explosion was the need for updated maps accounting for the number of housing units. In Puente Blanco residents assisted government officials after the explosion to develop updated housing maps to generate accurate counts of the houses affected and the number of residents in each unit. According to residents, one of the challenges of mapping the Puente Blanco community is the existence of multiple households in a single structure. Often the number of access lines to the utility company power line is used to determine the number of households, but sometimes several households share an access line. . If there is more than one household in the structure but there is only one access line to the utility company power line, the structure is erroneously counted as one housing unit regardless of the number of households in it.

Residents said that representatives from many agencies came to the communities. To the respondents the government response seemed “disorganized” in part because they were asked very often the same questions by officials from different agencies. This finding is particularly interesting given the changing role of the emergency management organization, and presents the need for further research. This finding suggests the need for a system that would facilitate file sharing and interagency collaboration. The Commonwealth Emergency Management organization has transitioned from a reactive to a proactive role in the sense that they are now expected to engage in mitigation initiatives. At the same time, the organization has been endowed with the primary responsibility of inter-agency coordination. Therefore, in many instances they are not the ones who directly attend an emergency but rather are the coordinators of the services needed from other agencies. Moreover, when the State EM office supports municipalities, those in charge of that jurisdiction can be

overshadowed or relegated to a backstage position even as the personnel directly assisting the community is not familiar with the area. There appears to be a conflict between the expectations of residents and the role of emergency managers. While local emergency managers may seek to maintain regular interaction with community residents, they may not be the immediate responders. Furthermore, as discussed in the previous chapter, there is great variation in terms of the daily activities in which emergency managers are engaged, since those activities depend on the tasks assigned by each mayor to their emergency management municipal office. In some cases those tasks extend beyond the realm of emergency management, in effect “becoming” the local practice of emergency management.

#### **7.14 Recovery and the Reproduction of Vulnerability**

In the months following the explosion, residents continued working with government agencies in the reconstruction of homes affected by the explosion. In Puente Blanco, the Board of Residents required daily and weekly meetings with government representatives to understand the recovery activities that were taking place in the community. Residents explained that the Department of Housing provided labor and materials to assist in the reconstruction of affected houses. CAPECO is also expected to cover the repair costs.

The problems affecting these communities are not unique or limited to their environmental affairs. They are impoverished communities that began as squatter settlements and that as a result developed in the margins of society. Although these communities are located in flood prone areas, many residents have received a Title of Property for the land and the structures they possess. While the process of obtaining the title resulted in decades of demands by local residents, as the government has

extended legal rights to residents they have also been required to extend public services to those neighborhoods. In the context of tense community/government relationships with communities that began as squatter settlements not recognized by the State, residents have developed and legitimized mechanisms to fulfill the functions of the absent government. Because of their prior experiences residents may often be hesitant to trust government organizations. Therefore, these communities have adopted ways to maintain control over what happens in the community, to solve disputes, to protect residents, to organize and achieve community goals that provide a better quality of life for residents, and mechanisms for self-representation in their interactions with government and the private sector. Future research will focus on how these social and cultural adjustments work, and what can be learned from them that would be useful in other places.

As stressed by Wisner (in Birkmann, 2006) we must develop “a community based disaster management approach.” To understand community vulnerability we must integrate taxonomic approaches with more dynamic participatory approaches. It is important to know the composition and distribution of the population residing in a community, and is paramount to examine structured social relationships as a more powerful source of explanation. The community-based disaster management approach advocates for a ground-up or dialogical approach in which scientists come as students. However, in some cases, like that of Cataño, is important to stress the need for, not necessarily scientific advice, but social science research that could empower residents, emergency managers, and ultimately contribute to reduce social vulnerability to disasters. For example, in the case of Cataño, in the communities studied there are not enough researchers involved with the neighborhood organization. After the explosion,

they have been having meetings with administrators and visiting the fuel storage facility. Residents explain that administrators provide them with details of the reconstruction of the facility, the cleaning process of the facility, and of planned future development. However, it is unclear how much detail they are being provided or what could be the implications of the planned changes. Scientists could be instrumental in helping both, communities and government organizations, collect and analyze appropriate data to be discussed at public hearings or debates. Future research should also explore the relationship between researchers and community leaders.

Community based disaster management approaches have better strategies to deal with marginal at risk communities. Another finding that emerged was the preference of these communities for community based programs. Residents in Puente Blanco talked about the Comunidades Especiales (Special Communities) program. The latter was a government initiative headed by sociologist Linda Colón Reyes that sought to promote self-management, capacity building, and empowerment in communities with high levels of poverty. Although the program was cancelled following the political administration of Governor Sila María Calderón, some communities are still benefiting from the investment made by the program. While I was doing research in the Puente Blanco community, some of the residents were getting involved with an initiative that would assist them in developing their own micro-businesses. The residents were to learn how to craft different foods for sale. Community leaders stressed that although in the beginning they had low expectations about the program, it provided the community with long-lasting resources, such as an equipped community center.

### 7.15 Concluding Remarks: Contrasting Perspectives in Emergency Management

During my visits to the field I observed communities that were in contrast with those described by emergency managers. While residents themselves regard some areas as dangerous, they also seemed very involved in community programs aimed at improving the well-being of those living in the area. The symbols observed throughout the community also made evident the commitment of residents. Older residents seemed to provide guidance to younger residents and also to reprimand them if they violate community rules. Another example is that of drug use. While drug trade is a problem in these communities, in most of them young residents are not allowed by community leaders to consume drugs or to get involved with groups selling drugs in the community. Instead, drug users are very often outsiders to the community.

Figure 7.12: Picture of the Puente Blanco Community



The symbols and norms observed in the communities are in contrast with the perception of outsiders that sometimes make out these communities as lawless and unstructured. These communities are better described as resistance communities. As a resident in Puente Blanco explained, they are not in need of leadership from the government. These communities need resources and capacity building opportunities. Another resident of Puente Blanco explained that they do not believe the promises of

political leaders or bureaucrats. She narrated that when the “Comunidades Especiales” program began, government employees installed a sign at the entrance of the community announcing that the community was a beneficiary of the program. When residents felt that the program was ineffective, they mobilized and took actions, such as covering the sign that designated the community as a program participant. In their opinion, the action of covering the sign coerced the government to respond to their claims.

As we discussed throughout this chapter the condition of vulnerability present in the communities surrounding the fuel storage facility is the result of an evolutionary process through which settlers seeking better opportunities offered by a changing economy and by distinct political arrangements established themselves in land that had not being claimed by private ownership. The government in turn was not able to prevent these settlements or to provide timely housing options. Moreover, because of the economic stagnation experienced by a decaying industrial economy (that was in part terminated by global market forces and U.S. trade agreements) the social mobility that was expected by those receiving government assistance did not materialize. Communities that were meant to offer temporary housing are now long standing impoverished communities experiencing high risk of flooding and poor environmental quality, among many other social problems.

When these communities interact with the government they do so in a way that is also a product of their historical relationship. Because of their legal status as squatter communities, for decades the government denied services to residents and overlooked their needs. These communities developed their own mechanisms that, if seen as an opportunity, could greatly enhance the capacity of emergency managers to

promote community preparedness. Lastly, devising a way to further familiarize state emergency managers with local jurisdictions and providing them with further community outreach training could facilitate response during emergency times. This will contribute to maintain a bureaucracy that would effectively provide government services and address the needs of those who it serves.

## Chapter 8

### **CONCLUSION: EMERGENCY MANAGEMENT IN PUERTO RICO AS A BUREAUCRATIC TYPE**

In the last decades emergency management has evolved from a reactive organization seeking to protect civilians from an obviously man-made threat, to a proactive organization that increasingly uses science to reduce disasters. Emergency management has greatly benefited from scientific management and management theory. Through the creation, extension, and standardization of emergency management procedures an increasingly sophisticate bureaucracy continues to develop and more services are offered to residents.

However, the rationalization of emergency management can be seen as paradoxical and often disconcerted. There have been many improvements in emergency management, but emergency managers themselves are also often constrained by that rationalization process, and by the context in which that rationalization process takes place (see also Waugh and Streib, 2006). For example, Law 81 designates a municipality as autonomous but that autonomy can be overthrown by the State during an emergency. This is often the case because jurisdictions do not have enough resources to manage large emergencies by themselves. The government bureaucracy of the contemporary colony is one with limited capacity that requires intervention and assistance. While Puerto Rico is considered a self-governing U.S. territory, there is a relationship of dependency that can be seen not just in the economic realm, but also in the cultural realm. The

increasing professionalization of emergency management in Puerto Rico has been achieved by rationalizing the praxis of emergency management. However, the rationalization process falls short when is permeated by a political relationship of disguised colonialism in which the Empire imposes its power, through programs, rules, and requirements that, in turn, illustrate the respect and submission of the Puerto Rican government. The installation of English speaking warning sirens in an island in which residents speak Spanish is a raw example of that cultural submission. Although emergency managers may see contradictions between their needs and mitigation or capacity building efforts, they are also embedded in inhabited institutions that compensate compliance to the rules of the bureaucracy and dismiss those that challenge its authority. In a context that is highly politicized bureaucrats are often hesitant to question authority and respect the established order because that can affect their appointment and workplace relations. As Frantz Fanon (1963:38) explained:

“The exemplary honesty of workers who are given a medal after fifty years of good and loyal service, and the affection which springs from harmonious relations and good behavior –all these aesthetic expressions of respect for the established order serve to create around the exploited person an atmosphere of submission and of inhibition which lightens the task of policing considerably.”

The Puerto Rico Emergency Management Agency has two masters – one is the United States, represented by FEMA and other U.S. agencies, the other is the system of politics that exist in Puerto Rico. Emergency management should be seen in this prism, in which often federal programs are performed ritualistically even as more pressing problems are often not managed, in effect reproducing social vulnerability. The local government has insufficient resources to maintain and sustain a developing emergency management agency. Those limitations allow the intervention by

outsiders in a way that, although beneficial, does not fully address the needs of Puerto Rico, and more importantly, perpetuates dependency.

Throughout this research, I operationalized social vulnerability as informed by community and organizational factors. That approach allowed me to uncover particular features of community/government relations that should be further explored as they could enhance or hinder emergency management efforts. Therefore, to gain a comprehensive understanding of social vulnerability to disasters as a process we must examine its dynamics in a macrocosm, in which the totality of the social system that impinges upon social actors is examined. As we discussed, the emergency management bureaucracy has a hierarchical distribution of power and responsibilities. Having a larger bureaucracy that steps in is beneficial, but it should not prevent or reduce the responsibility of local government of devoting resources for emergency management. The rationale for emergency management is that it would allow us to protect ourselves and others from the environment. In the quest to efficiently deliver emergency management services, there is also an unintentional threat undermine human/environment relationships, and also, to dehumanize those that we are trying to protect. As we saw in the case of Cataño, while a higher level of the bureaucracy with more resources took over the response to the event, the unintentional absence of the local emergency manager in the local communities was a source of uncertainty. State level emergency managers would also benefit from opportunities to gain a better knowledge of local jurisdictions. It should also be noted that the size of that bureaucracy should also be examined and collaboration among municipal emergency management offices should become a priority.

Multiple methods of research allowed me to have more accurate findings. For example, the fact that I could revisit the communities and contrast what was taking place in the communities with my readings of archival data was very valuable to gain a better understanding of the site. At the same time, the fact that I was able to continue my research in the same site for years allowed me to revisit themes that would have otherwise stayed unclear. Through this research, I employed different methods to explore the evolution of the organizational features and of the practice of emergency management in Puerto Rico; in a way that would allow me to integrate multiple perspectives about issues of emergency management and social vulnerability to disasters in Puerto Rico at the community level. While the sample size and the process of selection of participants do not allow me to generalize, the data collected provides very valuable insights that would otherwise be unknown to many audiences.

This research is a mix of opportunities. My interest in disasters allowed me to further my understanding of Puerto Rico and of multi-level social dynamics that impinge upon decision making and emergency management. At the same time, my interest in Puerto Rico allowed me to contribute to a debate on measuring social vulnerability. While this dissertation does not provide a measure of social vulnerability, it provides theoretical insights for the development of more refined measures. Moreover, my interest in Puerto Rico, because of its relationship with the United States, allowed me to explore how an hegemonic power impacts the activities of an emergency management organization operates, adapts, and ultimately how it manages emergencies and disasters. As argued by Briggs (2002:194), when studying many of the processes studied under the rubric of globalization, such as the feminization of the assembly line, the racialization of immigrant labor forces, anti-

poverty and welfare policies, the U.S. rhetoric of “benevolent” overseas interventions, and international disaster assistance among others must be analyzed sociologically, perhaps through studying Puerto Rico as the social laboratory where many global social processes can be observed.

Weber’s conceptualization of bureaucracy served as a guide that helped me develop my ideas and, consequently, a more integrated understanding of emergency management and social vulnerability to disasters in Puerto Rico. He was interested on how the emergence of bureaucracies results from an increasing rationalization that affects social action. He stressed that bureaucracies allow the coordination and control of action in society. In Weber’s view, an ideal bureaucracy is capable of planning and coordinating social action at a large scale while assuring the emergence of modern societies. However, Weber was studying Germany and did not consider how bureaucracies develop under colonial rule. In contrast, in this dissertation I examined how bureaucratic efforts regarding emergency management are shaped by FEMA, an agency of the US government, as well as by local traditions and political arrangements.

Over the last seventy years, the Commonwealth Emergency Management Organization evolved from a dependency under the governor’s office to a large and complex bureaucracy. During that time, and as it is observed in other places, the Puerto Rico Emergency Management Agency has enhanced and extended the services provided to residents and has extended the responsibilities of emergency managers from isolated responders to inter-agency coordination leaders. However, these changes have also taken place under arrangements that promote dependency and submission to the hegemonic power of the United States that create inefficiencies instead of

enhancing the ability to mitigate, prepare, respond, and recover from disasters. The emergency management organization of the Commonwealth of Puerto Rico should seek ways to become self-sufficient and financially solvent, as well as capable of illustrating FEMA on what the local practices and needs.

Although the Puerto Rico Emergency Management organization is increasingly adopting new emergency management technologies, the effectiveness of those technologies need to be evaluated in more detail. Moreover, needed is an integrated system of all agencies that have emergency management responsibilities, to facilitate inter-agency collaboration. As the Puerto Rico Emergency Management bureaucracy continues to evolve, challenges remain that would help it maximize its potential as the technically superior form of social organization. Moreover, it is imperative to evaluate disaster reduction efforts, particularly those that are transferred to Puerto Rico, to assure that they best meet the characteristics and situations of the local population. Disaster reduction efforts in at risk communities should be able to effectively create awareness, communicate risks, and empower residents to be first responders. Consideration must be given to political arrangements, cultural practices, and language barriers to assure that social vulnerability is not unintentionally reproduced and perpetuated.

Puerto Rico has undeniably benefited from its relationship with the United States. Some of the benefits observed in Puerto Rico include a reduction in poverty, the enhancement of the health services system, improvements in the living conditions of the population, and certainly, an increasingly modern emergency management organization. However, while Puerto Rico has reaped great benefits, it also faces daunting challenges. Puerto Rico continues to struggle with unemployment and

underemployment, with high levels of poverty, a deteriorated educational system, steep production costs, disproportionate dependence on the decaying industrial sector, excessive public debt, a weak tax system, and an aging infrastructure. Puerto Rico continues to be a showcase of the development and scientific management paradox, with both much social progress and a good deal of inefficiencies.

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## Appendix A

### EMERGENCY MANAGEMENT INTERVIEW PROTOCOL

Protocolo para entrevistas profundas  
Manejadores de Emergencia  
Puerto Rico  
CASA-ERC

#### A.1 Introduction

- Saludos y agradecimiento por su participación en las entrevistas
- Breve introducción de los participantes en la entrevista (nombre, afiliación, posición)
- Proveer una breve descripción de la tecnología que está desarrollando CASA y el objetivo principal del proyecto. CASA pretende desarrollar nuevas tecnologías para mejorar nuestra capacidad de observar la atmósfera y como consecuencia mejorar nuestra capacidad para predecir el tiempo.
- Una de las áreas de estudio o lo que se conoce en inglés como ‘test bed’ es Puerto Rico. Los radares que están siendo diseñados para Puerto Rico son un tanto diferentes a los que están siendo diseñados para Puerto Rico, de la misma forma los usuarios de Puerto Rico pueden tener necesidades diferentes.
- Objetivos de las entrevistas profundas
- Que el entrevistado pueda presentar su opinión de forma abierta y profesional
- Conocer la tecnología y las fuentes de información disponibles para usuarios en Puerto Rico
- Entender la perspectiva de los participantes del estudio en términos de las ventajas, desventajas y limitaciones de la tecnología que tienen disponible al momento.
- Explorar los flujos de información relacionada al tiempo (e.g. imágenes de radar, alertas, avisos) ¿Cuáles son las fuentes de información? ¿Cómo se utiliza esta información? ¿Cuán satisfechos están los usuarios con la información que reciben y su entendimiento de la misma. De ser necesario, ¿cómo mejorar la información que tradicionalmente reciben?
- Identificar cuáles son las mayores preocupaciones en términos de eventos, tipo de amenaza natural, su frecuencia y el impacto de los mismos en la comunidad.

- Conocer que factores, en términos de recursos, información y tecnología, necesitan ser tomados en consideración, para mejorar y contribuir a la toma de decisiones, preparación y respuesta a desastres naturales.
  - La entrevista tendrá una duración de aproximadamente 1 hora.
  - Atender cualquier pregunta del entrevistado
  - Administrar la hoja de consentimiento
  - Obtener su permiso para grabar la entrevista
  - Comenzar la grabación con el nombre de los participantes, su afiliación y posición.
1. Para comenzar nuestra discusión, ¿Nos podría decir su nombre, la agencia u organización que representa y su posición dentro de dicha agencia u organización?

## **A.2 Weather Information Sources**

La primera sección de preguntas tiene como objetivo el identificar las fuentes de información que usted utiliza y cuáles son sus preferencias en base a la información meteorológica que tiene disponible.

1. ¿Cuáles son sus fuentes principales de información?  
Seguimiento: ¿De dónde obtiene la información que necesita en relación al tiempo?
2. De las fuentes que mencionó, ¿hay alguna que sea la de su preferencia? ¿Por qué?  
Seguimiento: ¿Qué ofrece esa fuente diferente a otras?
3. ¿Cuáles son las limitaciones de su fuente principal de información?  
Abundar ¿Qué usted cambiaría en dicha fuente de información?
4. ¿Es esta su fuente de información principal durante toda la emergencia o la importancia de cada una de las fuentes de información varía durante la emergencia? ¿Por qué?

## **A.3 Weather Information and Decision Making**

Nos gustaría hablar un poco sobre como utiliza la información meteorológica como parte de su trabajo como manejador de emergencia o meteorólogo.

1. ¿Utiliza información de radar para su trabajo como manejador de emergencia?

2. ¿De qué tipo de información meteorológica usted depende para su trabajo como manejador de emergencia?
3. ¿Cuán frecuente accede la información en un día que al parecer es uno despejado? ¿Cuán frecuente accede la información en un día con mal tiempo?
4. ¿Para qué utiliza la información? (Pida un ejemplo concreto). ¿Cómo la información que accede impacta el proceso de toma de decisiones a nivel organizacional?
5. **INDAGUE SOBRE EL USO DE RADAR**
6. En cuanto a tecnología, ¿Cómo reciben la información sobre situaciones de emergencia o desastres? ¿Cómo transmiten en situaciones de emergencia o desastres?
7. ¿Con cuanta frecuencia utiliza la imagen de radar?
8. ¿De dónde obtiene la imagen de radar?
9. ¿Cuán importante son los datos de radar para usted y su agencia?
10. Teniendo en mente la información de radar que usted recibe como manejador de emergencia, ¿diría usted que se siente cómodo con su nivel de entendimiento y habilidad para utilizarla? ¿Desearía mayor entrenamiento en esa área? ¿Qué destrezas o conocimientos le gustaría adquirir o mejorar?
11. ¿Nos podría dar un ejemplo o contar una anécdota sobre un evento en el que la información meteorológica jugó un papel importante en el proceso de toma de decisiones de su organización? ¿Piensa usted que en esa situación la información era adecuada y completa o piensa que la información era inadecuada e incompleta?
12. Indagar ¿Por qué piensa que era... (Incompleta o completa)?
13. ¿Nos podría proveer ejemplos en los que el uso de la información meteorológica disponible lo llevo a una decisión no deseada? Explore los detalles.

#### **A.4 Weather Information: Precision, Accuracy, and Reliability**

1. ¿Cuál es la amenaza natural que afecta a su comunidad con mayor frecuencia?
2. ¿Cuál es la amenaza natural más peligrosa que su comunidad enfrenta?
3. Dentro de su municipio, en caso de una amenaza natural, ¿qué áreas/comunidades le provocan mayor preocupación? ¿Por qué?
4. ¿Cuán útil es la información que usted recibe en relación a las amenazas que afectan a su comunidad?
5. ¿Encuentra usted que la información es generalmente acertada y que los pronósticos y predicciones corresponden con las condiciones del tiempo reales?
6. ¿Cuán satisfecho está usted con este tipo de información?

7. En su experiencia trabajando en esta área, ¿cuáles han sido los mayores retos y limitaciones de la información que recibe?
8. ¿Qué recomendaciones haría para mejorar la información meteorológica que usa cuando enfrenta las amenazas naturales que identificó?

#### **A.5 Public and Organizational Communication**

1. ¿Qué agencias intervienen en caso de una emergencia o desastre?
2. ¿Con qué organizaciones se comunica más frecuentemente?
3. ¿Con cuál de las organizaciones que mencionó se le hace más fácil comunicarse efectivamente? ¿Con cuál se le hace más difícil?
4. En general, ¿cuán efectiva es la comunicación con otras organizaciones en avalar o facilitar la seguridad pública? ¿Cuán efectiva cree usted es la comunicación de riesgo en términos de la respuesta del público?
5. Si tuviera el poder para hacerlo, ¿cómo mejoraría la comunicación con otras agencias durante situaciones de emergencias?
6. ¿Qué tal en relación al público en general? ¿Qué usted haría para mejorar la comunicación con el público que reside en su área de manejo?
7. ¿Qué tipo de información sobre la emergencia o desastre se transmite a la población?
8. ¿Nos podría describir el sistema de aviso de emergencia que utiliza su agencia al momento? ¿Cómo funciona?
9. ¿Qué características o factores usted cree es importante considerar para desarrollar un sistema de aviso de emergencia efectivo (a que ciudadanos le prestaría mayor atención)?

#### **A.6 Risk Communication and the Media**

1. ¿Cómo describiría las relaciones de su oficina con los medios de comunicación? Describa la comunicación, interacción y coordinación.
2. ¿Cuál cree usted es el rol de los medios de comunicación? ¿Cuán importante cree usted son los medios de comunicación en caso de emergencias o desastres?
3. ¿Cuán frecuentemente utiliza los medios de comunicación para diseminar información?
4. ¿Cuán fácil o difícil le resulta comunicarse con los medios de comunicación?
5. ¿Qué medidas se toman para informar a las comunidades de escaso acceso a la información? (comunidades pobres sin acceso o con acceso limitado a los medios de comunicación)

6. ¿Cuáles cree usted pueden ser factores que afecten el flujo de información?
7. ¿Cree usted que los medios hacen un buen trabajo en comunicar la información de riesgo a la población de forma clara?

#### **A.7 Severe Weather Warnings: Problems, Challenges, and Solutions**

1. ¿Su agencia comunica información sobre eventos relacionados al tiempo (e.g. huracanes, inundaciones, derrumbes, etc) al público general? Si la respuesta es sí, ¿qué fuentes de información utiliza?
  2. ¿Ha tenido o confrontado algún tipo de problema o limitación al comunicar información del tiempo al público, por ejemplo, aviso de inundaciones? Por favor especifique.
  3. En su opinión, ¿la población general toma con seriedad la información que recibe?
  4. En su experiencia, ¿el mensaje diseminado consigue la respuesta del público que desea?
  5. Dada su experiencia, ¿qué se podría hacer para mejorar la diseminación de información del tiempo al público?
  6. ¿Qué cree usted son las características más importantes o los factores necesarios para desarrollar un sistema de alerta efectivo (al que las personas respondan)?
  7. ¿Cómo podemos aumentar la respuesta del público?
- A. Falsas alarmas: Si las falsas alarmas no han sido discutidas de forma espontánea por favor continúe con la siguiente batería de preguntas.

¿Ha sido su agencia responsable de emitir avisos oficiales que han resultado ser falsas alarmas? Si la respuesta es sí...

1. En su opinión, ¿cómo esto impacta la credibilidad de los sistemas de alertas o avisos de emergencia?
2. En su opinión, ¿cómo esto impacta la credibilidad de su oficina?
3. ¿Cómo el público reacciona a ese incidente? En su opinión, ¿ha tenido ese evento algún impacto en el comportamiento o la respuesta del público a otros avisos?
4. ¿Qué recomendaciones puede usted proveer para reducir las falsas alarmas?
5. Finalmente, ¿podría proveernos con un estimado del por ciento de avisos a su comunidad que son falsos?

- B. Tiempo de preparación: Si no ha sido discutido hasta este punto por favor continúe con la siguiente batería de preguntas.
1. ¿Ha recibido usted avisos de mal tiempo que no le han proveído tiempo suficiente para alertar a la población adecuadamente? Si la respuesta es sí por favor pida más detalles.
  2. Cuales han sido los mayores problemas que usted ha confrontado como consecuencia de un tiempo muy corto para prepararse?
  3. ¿Cómo ha impactado eso la toma de decisiones en su agencia?
  4. En su opinión, ¿cómo esto ha impactado la respuesta/comportamiento del público ante este tipo de emergencias?
  5. ¿Qué recomendaciones puede proveer para reducir este problema? (SI HA SIDO IDENTIFICADO COMO PROBLEMA)
  6. Finalmente, me gustaría hacerle una pregunta en relación a la definición oficial del Servicio Nacional de Meteorología sobre tiempo de preparación. El Servicio Nacional de Meteorología define como tiempo de respuesta el periodo de tiempo desde que se emite un aviso para una comunidad hasta que el evento impacta la comunidad. En base a esta respuesta, ¿cuánto usted estima es el tiempo promedio de preparación que ha tenido su comunidad en eventos pasados?
  7. ¿Está usted satisfecho con ese tiempo? o ¿cuál cree usted sería un tiempo óptimo?

#### **A.8 Technological Innovation, and End-User Needs and Characteristics**

Presuma que tiene la oportunidad de planificar y diseñar una nueva tecnología para el tiempo:

1. Pensando en algunas de las limitaciones que usted describió, ¿cuáles serían las características o capacidades más importantes que deberían ser incorporadas a esta tecnología?
2. Cuán importante son cada uno de los siguientes factores en el desarrollo de su tecnología (por qué son importantes?)
  - a. Precisión
  - b. Confiabilidad
  - c. Tipo de resolución
  - d. Reducción de falsas alarmas
  - e. Aumento del tiempo de preparación
  - f. Habilidad para detectar/predecir eventos específicos, por ejemplo, trombas marinas
  - g. Fáciles para el usuario
  - h. Accesibilidad

- i. Otros

### **A.9 Public Policy Issues**

Asuntos de política pública surgen en cuanto a la asignación de recursos.

Si dos comunidades están en peligro de ser impactadas por un evento extremo (por ejemplo, inundación, derrumbe, marejada ciclónica), ¿qué factores deberían ser tomados en consideración en la localización de los radares de CASA de forma tal que atiendan las necesidades de cada comunidad. (Algunas respuestas pueden ser: tamaño de la población, infraestructura, recursos de la comunidad)

1. ¿Cómo se deberían distribuir los radares?
2. ¿Qué criterios se deben utilizar?
3. ¿Quién debe tomar la decisión?

### **A.10 Summary**

1. ¿Hay alguna otra información que usted nos pueda proveer?
2. ¿Tiene alguna recomendación adicional que no se haya discutido hasta el momento?
3. ¿Algún otro comentario que le gustaría añadir?

### **A.11 Conclusion**

Describa el sistema de CASA en Puerto Rico:

- Estamos desarrollando un sistema que tenga mayor capacidad de ver la tropósfera baja
- Los radares trabajan de forma colaborativa dentro de una red
- Ciertos usuarios (NWS) serán utilizados para mover el radar
- Queremos que continúe estando envuelto en el diseño del sistema.

MUCHAS GRACIAS

## **Appendix B**

### **INFORMED CONSENT FORM**

Disaster Research Center (DRC)  
University of Delaware

Entrevistas Profundas  
Manejadores de Emergencia de Puerto Rico

Percepción de la Atmósfera Colaborativo y Adaptable (CASA)  
(Collaborative Adaptive Sensing of the Atmosphere (CASA))

### **HOJA DE CONSENTIMIENTO INFORMADO**

Estoy de acuerdo en participar en el proceso de entrevistas profundas que pretende entender como usuarios, particularmente los manejadores de emergencias en Puerto Rico, hacen uso de la información del tiempo y tecnología en su toma de decisiones. Durante la entrevista, vamos a discutir temas relacionados a sistemas de aviso de desastres, comunicación de riesgo, y el uso de tecnología en la preparación y respuesta a amenazas naturales. Específicamente, vamos a discutir como las organizaciones de manejo de emergencia usan, manejan, y diseminan información meteorológica e información sobre el tiempo. Este proyecto incluye entrevistas profundas con aproximadamente 25 participantes.

Esta investigación forma parte de un proyecto colaborativo entre el Disaster Research Center (DRC) en la Universidad de Delaware, el Centro de Investigación Social Aplicada (CISA) en la Universidad de Puerto Rico en Mayagüez, Oklahoma Climatological Survey (OSC), y la Universidad de Massachusetts en Amherst. Un investigador ya me ha explicado la contribución de mi entrevista a las metas generales del proyecto. El objetivo principal del proyecto Collaborative Adaptive Sensing of the Atmosphere (CASA) es la reducción de heridas, fatalidades, y daños a la propiedad como consecuencia de eventos atmosféricos extremos, como huracanes, tornados e inundaciones. Además, CASA busca desarrollar un sistema de radar que corresponda a los intereses, necesidades y recomendaciones de los usuarios. Este proyecto es un paso muy importante en esa dirección.

Entiendo que mi entrevista será grabada. Las grabaciones y las transcripciones de esta discusión serán archivadas por el DRC y podrán ser utilizadas para propósitos de investigación legítimos con la aprobación del director del centro. Entiendo que el riesgo de participar en este estudio es mínimo ya que la identidad de todos los participantes del estudio será mantenida en confidencialidad en todo momento. Cualquier información que pueda servir para identificar a un participante será removida de todos los datos archivados.

Entiendo que mi participación en este estudio es libre y voluntaria. Esto significa que tengo la libertad de participar en el mismo, así como de no contestar alguna pregunta si no deseo o dar por terminada la entrevista en cualquier momento sin proveer ninguna explicación. Si elijo no participar en el estudio entiendo que eso no tendrá impacto alguno en mi relación con ninguno de los centros de investigación mencionados. Entiendo que cualquier reporte basado en las entrevistas conducidas para este estudio no identificará a ningún individuo en específico.

Los investigadores han contestado todas las preguntas que tenía sobre el estudio y que esperan de nuestra entrevista. Me han informado que si tengo alguna pregunta sobre este proyecto de investigación puedo contactar al Dr. Havidán Rodríguez al 302-831-2147. También se me ha explicado que si tengo alguna pregunta sobre mis derechos como participante de este estudio debo contactar al Director del Comité para la Protección de Sujetos Humanos de la Universidad de Delaware (Human Subjects Review Board at the University of Delaware's Vice Provost for Research) al 302-831-2136.

He leído y entendido esta información. Además he recibido una copia de éste documento.

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Nombre (en letra de molde)

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Fecha

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Firma

Revisado January 2, 2008

## Appendix C

### CHRONOLOGIES

Appendix C presents a set of tables tracing the development of emergency management policies in Puerto Rico and in the United States. The chronology of emergency management policies in Puerto Rico includes political power in Puerto Rico and in the U.S.

#### **C.1 Chronological Evolution: Major U.S. Disaster and Emergency Management Policies**

<b>Year</b>	<b>Policy</b>	<b>President</b>
1803	Congressional Act of 1803: U.S. Congress provides disaster assistance to people affected by the Portsmouth fire in New Hampshire	Thomas Jefferson
1917	National Defense Council is established	Woodrow Wilson
1932	President Herbert Hoover created the Emergency Relief Administration (ERA)	Herbert Clark Hoover
1932	Reconstruction Finance Corporation – aimed at stimulating the economy but also in charge of the distribution of funds in the aftermath of disasters.	Herbert Clark Hoover
1933	<ul style="list-style-type: none"> <li>- National Emergency Council is established and then reestablished by President Franklyn D. Roosevelt in 1935.</li> <li>- Flood Control Act of 1934 – The Army Corps of Engineers is designated is given responsibility for flood control projects</li> </ul>	Herbert Clark Hoover
1933	President Franklin D. Roosevelt presents a relief operation under the New Deal. The New Deal established the Reconstruction Finance Corporation.	Franklin D. Roosevelt
1934	Bureau of Public Roads is given responsibility for the reconstruction of highways and roads in the aftermath of disasters.	Franklin D. Roosevelt
1937	Disaster Loan Corporation	Franklin D. Roosevelt
1940	The National Emergency Council becomes the Office for Emergency Management	Franklin D. Roosevelt

<b>Year</b>	<b>Policy</b>	<b>President</b>
1941	The National Defense Council becomes the Office of Civil Defense	Franklin D. Roosevelt
1944	Flood Control Act – charged the U.S. Army Corps of Engineers with responsibility over flood control and water irrigation projects.	Franklin D. Roosevelt
1947	The National Security Resources Board is established	Harry S. Truman
1948	Office of Civil Defense Planning is established (DOD)	Harry S. Truman
1949	<ul style="list-style-type: none"> <li>• The National Security Resources Board becomes part of the Executive Office of the President</li> <li>• The Office of Civil Defense Planning becomes the Office of Civil Defense Liaison</li> <li>• The Civil Defense and Disaster Compact is adopted by several states and approved by Congress the following year as an agreement of mutual aid.</li> </ul>	Harry S. Truman
1950	The Office of Defense Mobilization is created under the Executive Office of the President	Harry S. Truman
1950	Federal Disaster Relief Act and Civil Defense Act	Harry S. Truman
1951	Federal Civil Defense Administration (FCDA) is established and the functions of the Office of Civil Defense Liaison, and of the Office of Emergency Management are transferred to this new organization	Harry S. Truman
1951	<ul style="list-style-type: none"> <li>• The Defense Production Administration is established</li> <li>• <b>Executive Order 10242:</b> Prescribing Regulations Governing the Exercise by the Federal Civil Defense Administrator of Certain Administrative Authority Granted by the Federal Civil Defense Act of 1950</li> <li>• Executive Order 10260: The Federal Civil Defense Administration, the National Advisory Committee for Aeronautics, the Tennessee Valley Authority, and the United State Coast Guard become agencies of the government</li> </ul>	Harry S. Truman

<b>Year</b>	<b>Policy</b>	<b>President</b>
1951	<ul style="list-style-type: none"> <li>• <b>Executive Order 10296:</b> Providing for the Performance of Certain Defense Housing and Community Facilities and Services Functions</li> <li>• <b>Executive Order 10312:</b> Providing for Emergency Control Over Certain Government and Non-Government Stations Engaged in Radio Communication or Radio Transmission of Energy (revoked by EO 11490, 10/28/1969)</li> </ul>	Harry S. Truman
1952	<ul style="list-style-type: none"> <li>• <b>Executive Order 10346 :</b> Preparation by Federal Agencies of Civil Defense Emergency Plans</li> <li>• <b>Executive Order 10421:</b> Providing for the Physical Security of Facilities Important to the National Defense</li> </ul>	Harry S. Truman
1953	<ul style="list-style-type: none"> <li>• The Office of Defense Mobilization is merged into the Federal Civil Defense Administration (8/14/1953)</li> <li>• <b>Executive Order 10438</b> Transferring Certain Functions of the National Security Resources Board and of the Chairman Thereof to the Director of Defense Mobilization (revoked by EO 11051, 9/27/1962)</li> <li>• <b>Executive Order 10480:</b> Further Providing for the Administration of the Defense Mobilization Program</li> </ul>	Dwight D. Eisenhower
1954	<ul style="list-style-type: none"> <li>• <b>Executive Order 10529:</b> Participation by Federal Employees in State and Local Civil Defense Pre-Emergency Training Programs</li> </ul>	Dwight D. Eisenhower
1955	<ul style="list-style-type: none"> <li>• <b>Executive Order 10634:</b> Providing for loans to aid in the reconstruction, rehabilitation, and replacement of facilities which are destroyed or damaged by a major disaster and which are required for the national defense.</li> <li>• <b>Executive Order 10638:</b> Authorizing the Director of the Office of Defense Mobilization to order the release of strategic and critical materials from stock piles in the event of an attack upon the United States</li> </ul>	Dwight D. Eisenhower

<b>Year</b>	<b>Policy</b>	<b>President</b>
1956	<ul style="list-style-type: none"> <li>• <b>Executive Order 10660</b> Providing for the Establishment of a National Defense Executive Reserve</li> </ul>	Dwight D. Eisenhower
1958	<ul style="list-style-type: none"> <li>• The Federal Civil Defense Administration becomes the Office of Defense and Civilian Mobilization and then the Office of Civil and Defense Mobilization</li> <li>• <b>Executive Order 10773</b>: Delegating and transferring certain functions and affairs to the Office of Defense and Civilian Mobilization</li> </ul>	Dwight D. Eisenhower
1961	<ul style="list-style-type: none"> <li>• Office of Civil and Defense Mobilization becomes the Office of Emergency Planning and the Office of Civil Defense under the Department of Defense is created. 1961</li> <li>• An Office of Emergency Preparedness is established in the White House</li> <li>• <b>Executive Order 10958</b>: Delegating functions with respect to civil defense stockpiles of medical supplies and equipment and food</li> </ul>	John F. Kennedy
1962	<ul style="list-style-type: none"> <li>• Executive Order 11051: Prescribing Responsibilities of the Office of Emergency Planning in the Executive Office of the President (revoked)</li> <li>• Executive Order 10999: Assigning Emergency Preparedness Functions to the Secretary of Commerce</li> <li>• Executive Order: 11000: Assigning Emergency Preparedness Functions to the Secretary of Labor</li> <li>• Executive Order 11001: Assigning Emergency Preparedness Functions to the Secretary of Health, Education, and Welfare</li> <li>• Executive Order 11002: Assigning Emergency Preparedness Functions to the Postmaster General</li> <li>• Executive Order 11003: Assigning Emergency Preparedness Functions to the Administrator of the Federal Aviation Agency</li> </ul>	John F. Kennedy

<b>Year</b>	<b>Policy</b>	<b>President</b>
1962	<ul style="list-style-type: none"> <li>• Executive Order 11004: Assigning Emergency Preparedness Functions to the Housing and Home Finance Administrator</li> <li>• Executive Order 11005: Assigning Emergency Preparedness Functions to the Interstate Commerce Commission</li> </ul>	John F. Kennedy
1964	<ul style="list-style-type: none"> <li>• The Office of Civil Defense is transferred from the Department of Defense to the Army</li> <li>• Hurricane Betsy</li> </ul>	Lyndon B. Johnson
1968	<ul style="list-style-type: none"> <li>• The Office of Emergency Planning becomes the Office of Emergency Preparedness</li> <li>• National Flood Insurance Act of 1968</li> </ul>	Lyndon B. Johnson
1969	Executive Order 11490: Assigning emergency management functions to Federal departments and agencies (revoked by EO 12656, 11/18/1988)	Richard Nixon
1970	Office of Telecommunications is established	Richard Nixon
1972	Flood Insurance Act of 1972	Richard Nixon
1973	Federal Disaster Assistance Administration was created within the Department of Housing and Urban Development	Richard Nixon
1973	The Department of the Treasury, the Federal Assistance Administration, and the Office of Preparedness are established	Richard Nixon
1974	<ul style="list-style-type: none"> <li>• Disaster Relief Act</li> <li>• <b>Executive Order 11795</b>: Delegating disaster relief functions pursuant to the Disaster Relief Act of 1974</li> </ul>	Richard Nixon
1975	The Office of Preparedness becomes the Federal Preparedness Agency	Gerald Ford
1976	Adjusting Emergency Preparedness Assignments to Organizational and Functional Changes in Federal Departments and Agencies	June 11
1977	Floodplain Management Act (Executive Order 11988) – focus on risk reduction and impacts on humans reduction	
1978	Office of Telecommunications Policy becomes the Office of Science and Technology Policy <ul style="list-style-type: none"> <li>• President Carter submits Reorganization Plan Number 3 to Congress – which includes the creation of FEMA</li> </ul>	Jimmy Carter

<b>Year</b>	<b>Policy</b>	<b>President</b>
1978	Governors' Association report <ul style="list-style-type: none"> <li>• Comprehensive Emergency Management is introduced</li> </ul>	Jimmy Carter
1979	<ul style="list-style-type: none"> <li>• Executive Order 12127: Creation of the Federal Emergency Management Agency begins – the functions of the Federal Preparedness Agency, of the Federal Disaster Assistance Administration, of the Defense Civil Preparedness Agency, of Dam Safety Coordination, of Earthquake Hazard Reduction, of Consequence Management in Terrorism, of the National Fire Prevention and Control Administration, and of the National Weather Service Community Preparedness Program were made part of the new organization.</li> <li>• <b>Executive Order 12148</b> : Transfer of governmental emergency management functions to the Federal Emergency Management Agency</li> </ul>	Jimmy Carter
1982	<b>Executive Order 12379</b> : Termination of boards, committees, and commissions	Ronald Reagan
1988	<ul style="list-style-type: none"> <li>• Robert T. Stafford Disaster Relief and Emergency Assistance Act – amended the Disaster Relief Act of 1974</li> <li>• Executive Order 12656: Assignment of emergency preparedness responsibilities</li> </ul>	Ronald Reagan
1992	<ul style="list-style-type: none"> <li>• Federal Response Plan – included 28 federal agencies and the Red Cross</li> <li>• The creation of the Emergency Management Assistance Compact is started following Hurricane Andrew.</li> </ul>	George H. W. Bush
1993	The Southern Governors' Association signed the Southern Regional Emergency Management Assistance Compact (SREMAC).	William J. Clinton
1993	James Lee Witt becomes the first professional emergency manager appointed to the position of director of FEMA – shift towards mitigation	William J. Clinton
1994	Executive Order 12919: National Defense Industrial Resources Preparedness	William J. Clinton

<b>Year</b>	<b>Policy</b>	<b>President</b>
1996	Emergency Management Assistance Compact (EMAC) is adopted after the Southern Governors' Association voted in favor of opening membership to any state or territory in the Union.	William J. Clinton
1997	The Project Impact program was launched	William J. Clinton
2000	Disaster Mitigation Act – amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act	William J. Clinton
2001	<ul style="list-style-type: none"> <li>• Project Impact is eliminated</li> <li>• USA Patriot Act of 2001 – Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act</li> <li>• Executive Order (EO) 13224 – Sept. 23, 2001 <ul style="list-style-type: none"> <li>– Defined “terrorism”</li> <li>– Blocked Property and Prohibited Transactions</li> </ul> </li> <li>• EO 13228 – Oct. 8, 2001 <ul style="list-style-type: none"> <li>– Established Office of Homeland Security</li> <li>– Homeland Security Council</li> <li>– Coordinated federal activities</li> </ul> </li> <li>• EO 13231 – Oct. 16, 2001 <ul style="list-style-type: none"> <li>– Critical Infrastructure Protection in the Information Age</li> <li>– Supersedes PDD 63</li> </ul> </li> <li>• Homeland Security Presidential Directive (HSPD) 1: Establishing the Homeland Security Council (2001) <ul style="list-style-type: none"> <li>– Coordinated federal activities</li> </ul> </li> <li>• HSPD 2: Combating Terrorism Through Immigration Policies (2001) <ul style="list-style-type: none"> <li>– Foreign Terrorist Tracking Task Force</li> <li>– Locate, detain, prosecute, or deport terrorist aliens already present</li> </ul> </li> </ul>	George W. Bush

Year	Policy	President
2002	<ul style="list-style-type: none"> <li>• Homeland Security Act – the Department of Homeland Security (DHS) is established. DHS integrated 22 agencies, including FEMA.</li> <li>• Aviation and Transportation Security (ATS) Act of 2002</li> <li>• Public Health Security and Bioterrorism Preparedness and Response Act of 2002</li> <li>• Emergencies Involving Nuclear Materials 2002</li> <li>• HSPD 3: Homeland Security Advisory System (2002) – color coded warnings</li> <li>• HSPD 4: National Strategy to Combat Weapons of Mass Destruction (2002)</li> <li>•</li> </ul>	George W. Bush
2003	<ul style="list-style-type: none"> <li>• Comprehensive Homeland Security Act – focused on terrorism, border security, and intelligence</li> <li>• <b>Executive Order 13286:</b> Amendment of Executive Orders, and Other Actions, in Connection With the Transfer of Certain Functions to the Secretary of Homeland Security</li> <li>• National Emergencies Act of 2003</li> <li>• Defense Against Weapons of Mass Destruction Act of 2003</li> <li>• Emergencies Involving Chemical or Biological Weapons 2003</li> <li>• HSPD 5: Management of Domestic Incidents (2003)</li> <li>• HSPD 6: Integration and Use of Screening Information (2003)</li> <li>• HSPD 7: Critical Infrastructure Identification, Prioritization, and Protection (2003)</li> <li>• HSPD 8: National Preparedness (2003)</li> </ul>	George W. Bush

<b>Year</b>	<b>Policy</b>	<b>President</b>
2004	<ul style="list-style-type: none"> <li>• National Incident Management Strategy (NIMS) is mandated</li> <li>• National Response Plan – replaced the Federal Response Plan</li> <li>• HSPD 9: Defense of United States Agriculture and Food (2004)</li> <li>• HSPD 10: Biodefense for 21st Century (2004)</li> <li>• HSPD 11: Comprehensive Terrorist-Related Screening Procedures (2004)</li> <li>• HSPD 12: Policy for a Common Identification Standard for Federal Employees and Contractors (2004)</li> </ul>	George W. Bush
2005	Hurricane Katrina and Rita	George W. Bush
2005	Pets and Transportation Standards Act – amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act	George W. Bush
2006	<p>Post-Katrina Emergency Management Reform Act – FEMA Administrator reports to the President again</p> <ul style="list-style-type: none"> <li>• HR 5441 Title VI ‘Post-Katrina Emergency Management Reform Act of 2006’ Subtitle B Personnel Provisions</li> <li>• Address unprecedented turnover at FEMA Subpart I of part III of Title 5 USC amended</li> <li>• Sec. 10102 Mandates Strategic Human Capital Plan <ul style="list-style-type: none"> <li>– Workforce Gap Analysis</li> <li>– Plan of Action: address skills, competencies gaps</li> <li>– Discussion of needs, capabilities</li> <li>– 5 yearly updates</li> <li>– Sec. 10103 Career Paths - Identify education, training, experience, and assignments necessary for career progression</li> <li>– Sec. 10104 Recruitment Bonuses 25 %</li> <li>– Sec. 10105 Retention Bonuses 25 %</li> <li>– Sec. 10106 Vacancy Rate Report</li> <li>– Sec. 622 Employee Rotation Program</li> <li>– Sec. 623 Homeland Security</li> </ul> </li> </ul>	George W. Bush

<b>Year</b>	<b>Policy</b>	<b>President</b>
2006 (cont.)	<ul style="list-style-type: none"> <li>– Education Program Establishes graduate-level Homeland Security Education Program in National Capital Region</li> <li>• 2006 Appropriations Act</li> </ul>	
2007	<b>Executive Order 13442:</b> Amending the Order of Succession in the Department of Homeland Security	
2008	National Response Framework	George W. Bush
2008	NIMS revised document	George W. Bush
2009	<b>Executive Order 13527:</b> Establishing Federal Capability for the Timely Provision of Medical Countermeasures Following a Biological Attack	Barack Obama
2011	National Preparedness Presidential Policy Directive 8 – focused on the identification of capabilities and in the development of a national system with the goal of achieving preparedness	Barack Obama

## C.2 Federal Emergency Management Directors

<b>Name</b>	<b>Term of Office</b>
Gordon Vickery	April 1979 - July 1979
Thomas Casey	Jul-79
John Macy	August 1979 - January 1981
Bernard Gallagher	January 1981 - April 1981
John W. McConnell	April 1981 - May 1981
Louis O. Giuffrida	May 1981 - September 1985
Robert H. Morris	September 1985 - November 1985
Julius W. Becton, Jr.	November 1985 - June 1989
Robert H. Morris	June 1989 - May 1990
Jerry D. Jennings	May 1990 - August 1990
Wallace E. Stickney	August 1990 - January 1993
William C. Tidball	January 1993 - April 1993
James L. Witt	April 1993 - January 2001
John Magaw	January 2001 - February 2001
Joe M. Allbaugh	February 2001 - March 2003
Michael D. Brown	March 2003 - September 2005

<b>Name</b>	<b>Term of Office</b>
R. David Paulison	September 2005 - January 2009
Nancy Ward	January 2009 - May 2009
Craig Fugate	May 2009 - Present

### **C.3 Chronological Evolution: Puerto Rico Disaster and Emergency Management Policies and Official Documents**

<b>Year</b>	<b>Policy</b>	<b>Governor</b>
1942	<b>Law 33, April 16, 1942</b> – The Puerto Rico Civil Defense is established	Rexford G. Tugwell
1956	<b>Presidential Disaster Declaration # 62</b> – Hurricane	
1958	<b>Law 104, June 25, 1958</b> – The Condominium’s Law is approved.	J. Luis A. Muñoz Marín
1964	<b>Presidential Disaster Declaration # 170</b> – Extreme Drought Conditions	
1966	<b>Law 91, June 21, 1966</b> – The Emergency Fund Law is approved.	Roberto Sanchez Vilella
1969	<b>Law 134, June 28, 1969</b> – Puerto Rico’s Explosives Law is first approved.	Luis A. Ferré Aguayo
1970	<b>Presidential Disaster Declaration # 296</b> – Heavy rains and flooding / Oct 12, 1970	
1974	<b>Presidential Disaster Declaration #455</b> – Flooding / November 30, 1974	
1975	<ul style="list-style-type: none"> <li>• Puerto Rico Civil Defense moves to a new facility</li> <li>• <b>Law #5 Puerto Rico Public Servant Law</b> – establishes that the principle of merit should always be used in personnel management decisions.</li> <li>• <b>Presidential Disaster Declaration # 483</b> – Tropical Storm Eloise</li> </ul>	Rafael Hernández Colón
1976	<b>Law 22, June 23, 1976:</b> The Puerto Rico Civil Defense <i>Agency</i> is established.	Rafael Hernández Colón
1977	The Puerto Rico Urban Search and Rescue Academy is established in the municipality of Gurabo.	Carlos Romero Barceló

<b>Year</b>	<b>Policy</b>	<b>Governor</b>
1979	<b>Presidential Declaration #597</b> – Hurricane David	
1985	<ul style="list-style-type: none"> <li>• <b>Law 12: Governmental Ethics Law</b> is approved.</li> <li>• <b>Presidential Disaster Declaration #736:</b> Storms, Mud/Landslides, Flooding / May 16-21, 1985.</li> <li>• <b>Presidential Disaster Declaration #746:</b> Severe storms, Flooding, Mudslides / October 4-7, 1985.</li> </ul>	Rafael Hernández Colón
1986	<b>Presidential Disaster Declaration # 768:</b> Heavy Rains, Flooding, Mudslides / April 25-May14, 1986.	
1987	<b>Presidential Disaster Declaration # 805:</b> Severe storms, Flooding / November 21-December 9, 1987.	
1988	<b>Joint Resolution 172, June 22, 1988:</b> Established the Planning Program for the Mitigation of Natural Risks (Programa de Planificación para la Mitigación de Riesgos Naturales), under the Puerto Rico Department of Environmental and Natural Resources.	Rafael Hernández Colón
1989	<b>Presidential Disaster Declaration # 842:</b> Hurricane Hugo / September 17-18, 1989.	
1992	<b>Presidential Disaster Declaration # 931:</b> Flooding, Severe Storm / January 5-6, 1992.	
1993	The Safety and Public Protection Commission is established (Plan de Reorganización del 9 de diciembre de 1993)	Pedro J. Roselló González
1994	<b>Law 144, December 22, 1994</b> – The 9-1-1 Calls Law is approved. Established and regulates the island’s 9-1-1 calling system.	Pedro J. Roselló González
1995	<b>Memorandum Letter 1300-5-96:</b> <b>Presidential Disaster Declaration # 1068:</b> Hurricane Marilyn / September 16, 1995.	Pedro J. Roselló González

Year	Policy	Governor
1996	<ul style="list-style-type: none"> <li>• <b>Executive Order 1996-11:</b> Authorized disbursements from the Emergency Fund in order to match the Federal government contribution for the reconstruction of houses destroyed by Hurricane Marilyn (FEMA-1068-DRPR).</li> <li>• <b>Executive Order 1996-12:</b> Amended Executive Order 1995-70 – Authorized the disbursement of additional resources from the Emergency Fund.</li> <li>• <b>Presidential Disaster Declaration # 1136:</b> Hurricane Hortense / September 9-11, 1996</li> <li>• <b>Executive Order 1996-18:</b> Authorized the disbursement of 171,587 dollars from the Emergency Funds that the Puerto Rico Firefighters Corp can cover expenses related to Hurricanes Luis and Marilyn.</li> <li>• <b>Executive Order 1996-29:</b> Orders the activation of the military forces of Puerto Rico because of the threat of Hurricane Bertha, authorized the disbursement of budget funds, and the establishment of additional dispositions.</li> <li>• <b>Executive Order 1996-30:</b> Orders closing all commercial establishments in light of a hurricane watch emitted by the National Weather Service about Hurricane Bertha.</li> <li>• <b>Executive Order 1996-31:</b> Ban on alcohol in preparation for Hurricane Bertha</li> <li>• <b>Executive Order 1996-32:</b> Authorized the disbursement of resources from the Emergency Fund</li> <li>• <b>Executive Order 1996-33:</b> Activated the Department of Natural Resources rangers</li> </ul>	Pedro J. Roselló González

Year	Policy	Governor
1996	<ul style="list-style-type: none"> <li>• <b>Executive Order 1996-45:</b> Orders closing of all commercial establishments in light of tropical storm Hortense.</li> <li>• <b>Executive Order 1996-46:</b> Ban on alcohol in light of tropical storm Hortense.</li> <li>• <b>Executive Order 1996-47:</b> Activated the Department of Natural Resources rangers</li> <li>• <b>Executive Order 1996-48:</b> Orders the activation of the military forces of Puerto Rico because of the threat of tropical storm Hortense, authorized the disbursement of budget funds, and the establishment of additional dispositions.</li> <li>• <b>Executive Order 1996-49:</b> Authorized the disbursement of resources from the Emergency Fund</li> <li>• <b>Executive Order 1996-50:</b> Authorized the disbursement of resources from the Emergency Fund</li> <li>• <b>Executive Order 1996-60:</b> Authorized disbursements from the Emergency Fund in the amount of 198,181 dollars to provide temporary housing to eight families affected by Hurricane Marilyn in the municipality of Culebra</li> <li>• <b>Executive Order 1996-70:</b> Humberto Vidal Building Explosion-amended commercial establishments schedule regulations to support response efforts in the municipality of Río Piedras.</li> <li>• <b>Executive Order 1996-71:</b> Assigns the responsibility of removal and clean-up of the Humberto Vidal building.</li> </ul>	Pedro J. Roselló González

Year	Policy	Governor
1996 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Law 207, December 30, 1997:</b> Transfers the Planning Program for the Mitigation of Natural Risks from the Department of Environmental and Natural Resources to the State Civil Defense Agency.</li> <li>• <b>Executive Order 1997-01:</b> Ban on nepotism in government hiring</li> </ul>	Pedro J. Roselló González
1997	<ul style="list-style-type: none"> <li>• <b>Law 144, December 22, 1997:</b> Establishes the Medical Emergencies Corp separate from the Firefighters Corp.</li> </ul>	Pedro J. Roselló González
1998	<ul style="list-style-type: none"> <li>• <b>Executive Order 1998-24:</b> Lifts commercial establishments schedule regulations in light of Hurricane Georges</li> <li>• <b>Executive Order 1998-25:</b> Ban on alcohol in light of Hurricane Georges.</li> <li>• <b>Executive Order 1998-26:</b> Orders the activation of the military forces of Puerto Rico because of the threat of Hurricane Georges.</li> <li>• <b>Executive Order 1998-27:</b> Authorized disbursements from the Emergency Fund</li> <li>• <b>Executive Order 1998-28:</b> Authorized disbursements from the Emergency Fund</li> <li>• <b>Executive Order 1998-30:</b> Declared the island in state of emergency</li> <li>• <b>Executive Order 1998-31:</b> Declared the American Red Cross the leader of disaster volunteer organizations.</li> <li>• <b>Presidential Disaster Declaration # 1247:</b> Hurricane Georges / September 24, 1998.</li> <li>• <b>Executive Order 1998-35:</b> established the “Nuevo Hogar Seguro” (New Safe Home) program. to mitigate and on replacing housing units lost during Hurricane Georges.</li> </ul>	Pedro J. Roselló González

Year	Policy	Governor
1998 (Cont.)	<ul style="list-style-type: none"> <li>• FEMA provides flood insurance coverage to 3,255 families for a period of three years following Hurricane Georges.</li> </ul>	
1999	<ul style="list-style-type: none"> <li>• <b>Law 211 – April 2, 1999:</b> Transformed the Civil Defense into the Puerto Rico State Agency for Emergency Management and Disaster Administration</li> <li>• <b>Executive Order 1999-51:</b> Ban on alcohol in light of Hurricane Lenny.</li> <li>• <b>Executive Order 1999-52:</b> Lifts commercial establishments schedule regulations in light of Hurricane Lenny</li> <li>• <b>Executive Order 1999-53:</b> Orders the activation of the military forces of Puerto Rico because of the threat of Hurricane Lenny.</li> <li>• <b>Executive Order 1999-54:</b> Declared the island in state of emergency</li> <li>• <b>Executive Order 1999-55:</b> Authorized disbursements from the Emergency Fund</li> <li>• <b>Executive Order 1999-56:</b> Authorized disbursements from the Emergency Fund</li> <li>• <b>Presidential Disaster Declaration # 3151:</b> Hurricane Lenny / November 17-20, 1999</li> </ul>	Pedro J. Roselló González
2000	<ul style="list-style-type: none"> <li>• <b>Law 150, August 10, 2000:</b> The Law on Education in Prevention and Emergency Management and Disasters of Puerto Rico (Ley de Educación en la Prevención y Manejo de Emergencias y Desastres en Puerto Rico) is approved. Contends that Hurricane Georges highlighted the need for preparedness. Declared disaster prevention as the public policy of the island and provides a legislative vehicle for establishing an educational program on emergency management through the Department of Education. (Author: Severo Colberg Toro, submitted on Feb 2001, approved August 2002)</li> </ul>	Pedro J. Roselló González

Year	Policy	Governor
2000 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2000-30:</b> Ban on alcohol in light of Hurricane Debby.</li> <li>• <b>Executive Order 2000-31:</b> Lifts commercial establishments schedule regulations in light of Hurricane Debby</li> <li>• <b>Executive Order 2000-32:</b> Orders the activation of the military forces of Puerto Rico because of the threat of Hurricane Debby.</li> <li>• <b>Executive Order 2000-33:</b> Authorized disbursements from the Emergency Fund</li> <li>• <b>Executive Order 2000-39:</b> Authorized the Puerto Rico State Agency for Emergency Management and Disaster Administration and each municipality to organize volunteer groups and authorized the disbursement of funds from the Emergency Fund for this purpose.</li> <li>• <b>Executive Order 2000-54:</b> Designation of the State Emergency and Disaster Management Agency as the Agency that will carry out provisions of the Federal Transit Administration's Rule on State Safety Oversight of fixed Guideway Systems</li> </ul>	Pedro J. Roselló González
2001	<ul style="list-style-type: none"> <li>• <b>Law 1, March 1, 2001</b> – The Law for the Integral Development of Special Communities in Puerto Rico is approved (Ley para el Desarrollo Integral de Comunidades Especiales de Puerto Rico).</li> <li>• <b>Executive Order 2001-10:</b> Created the Autonomous Municipalities Law Assessment Commission.</li> <li>• <b>Executive Order 2001-26:</b> Established the coordination of executive functions related to emergency management or disasters and derogates administrative bulletins.</li> <li>• <b>Presidential Disaster Declaration # 1372:</b> Flooding / May 6-11, 2001.</li> </ul>	Sila M. Calderón Serra

Year	Policy	Governor
2001 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2001-42:</b> Authorized the disbursement of 12,155,267 dollars to complete the payment of a FEMA loan taken to provide economic assistance during Hurricane Hugo.</li> <li>• <b>Executive Order 2001-45:</b> Activated and authorized the disbursement of funds from the Emergency Fund to support humanitarian efforts in the cities affected by the 9/11 attacks.</li> <li>• <b>Executive Order 2001-46:</b> Authorized the use of equipment and personnel to support rescue missions in the States of New York and Virginia after the 9/11 terrorist attacks.</li> <li>• <b>Executive Order 2001-49:</b> Orders a general emergency drill to evaluate the efficiency of agencies dealing with the public in case of emergency; including the State Agency for Emergency Management and Disaster Administration, the Puerto Rico Police, The Puerto Rico Fire Department, the Environmental Quality Board, the 9-1-1 Service, and the Health Department.</li> <li>• <b>Executive Order 2001-57:</b> Authorized Agencies and Public Corporations to join the marathon “United for New York” through a plan that allows employees to donate vacation days or cash.</li> <li>• <b>Executive Order 2001-63:</b> Declared several municipalities in state of emergency following of heavy rain. Authorized the use of resources from the Emergency Fund.</li> <li>• <b>Presidential Disaster Declaration # 1396:</b> Severe Storms, Flooding / November 7-9, 2001</li> <li>• The flood insurance policy of families assisted following Hurricane Georges expired on December 23, 2001.</li> </ul>	Sila M. Calderón Serra

Year	Policy	Governor
2002	<ul style="list-style-type: none"> <li>• <b>Law 18, January 5, 2002:</b> Amended the 1994 9-1-1 Calls Law. The presidency of the government board in charge of the 9-1-1 system is transferred from the director of the Safety and Protection Commission to the director of the Puerto Rico State Police.</li> <li>• <b>Executive Order 2002-21:</b> Authorized the payment of 846,300 from the Emergency Fund to cover flood policies of disadvantaged families affected by Hurricane Georges. Although the families committed to pay for their policies once FEMA funding would end, they were unable to cover the costs.</li> </ul>	Sila M. Calderón Serra
2003	<ul style="list-style-type: none"> <li>• <b>Executive Order 2003-02:</b> Authorized the payment of 12.155.267 dollars to FEMA to pay for a loan taken for the Hurricane Hugo disaster.</li> <li>• <b>Executive Order 2003-21:</b> Order to adopt an Inter-agency coordination system for the management of terrorist attacks.</li> <li>• <b>Executive Order 2003-23:</b> Orders the creation of the inter-religious chaplains corps of the Commonwealth of Puerto Rico ascribed to the State Agency for Emergency Management and Disaster Administration.</li> <li>• <b>Executive Order 2003-29 and 30:</b> Declared a state of emergency in the municipalities of Fajardo, Río Grande, Naguabo, Las Piedras, Juncos, Humacao, Luquillo, and Trujillo Alto because of heavy rain. Authorized the use of resources from the Emergency Fund.</li> <li>• <b>Executive Order 2003-54:</b> Includes the 9-1-1 service as part of the executive functions of the State Agency for Emergency Management and Disasters Administration.</li> </ul>	Sila M. Calderón Serra

Year	Policy	Governor
2003 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2003-70, 71, and 72:</b> Declared a state of emergency in the municipalities of Salinas, Guayama, Maunabo, Río Grande, Guánica, Patillas, Juana Díaz, Yauco, Arroyo, Canóvanas, Fajardo, Loiza, Naguabo, Toa Baja, Yabucoa and Santa Isabel following heavy rainfall that took place in November of that year.</li> <li>• <b>Presidential Disaster Declaration # 1501:</b> Severe Storms, Flooding, Mud/Landslides /November 10-23, 2003.</li> </ul>	Sila M. Calderón Serra
2004	<ul style="list-style-type: none"> <li>• <b>Law 9, January 8, 2004:</b> Amended the 1994 9-1-1 Calls Law. Adds the director of the Firefighters Corp to the 9-1-1 Service Government Board. Includes the Medical Emergencies Corp in the definition of ‘public safety agency’.</li> <li>• <b>Law 447, September 23, 2004:</b> Amended the 1999 State Emergency Management and Disaster Administration Law. Defines and integrates voluntary groups. Assigns the responsibility of organizing volunteer groups to the director. Authorized each municipality to develop a group of volunteers. Outlines the role of volunteers “To provide auxiliary services”.</li> <li>• <b>Puerto Rico Emergency Management and Homeland Security Statutory Authorities.</b> Emergency Management and Homeland Security Statutory Authorities Profile. Congressional Research Service Report for Congress.</li> <li>• <b>Executive Order 2004-01:</b> Authorized the disbursement of up to \$20 million dollars to assist families affected by the November 2003 disaster.</li> </ul>	Sila M. Calderón Serra

Year	Policy	Governor
2004 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2004-02:</b> Authorized the payment of 656,480 dollars from the Emergency Fund to cover the cost of the flood insurance policies of disadvantaged families affected by Hurricane Georges.</li> <li>• <b>Executive Order 2004-21, 22, and 23:</b> Declared a state of emergency in the municipalities of Corozal, Aguas Buenas, Trujillo Alto, Toa Alta, Caguas, San Juan and Naranjito following heavy rainfall in May 2003.</li> <li>• <b>Executive Order 2004-25:</b> The Commonwealth of Puerto Rico adopted the State Plan for the Mitigation of Natural Hazards in Puerto Rico and orders its implementation throughout the involved agencies. This is in response to federal requirements of the 2000 Disaster Mitigation Act.</li> <li>• <b>Executive Order 2004-54:</b> Declared a state of emergency before storm Jeanne</li> <li>• <b>Executive Order 2004-55:</b> Ban on alcohol in light of storm Jeanne.</li> <li>• <b>Executive Order 2004-56:</b> Orders the activation of the military forces of Puerto Rico because of the threat of storm Jeanne.</li> <li>• <b>Executive Order 2004-58, 60, and 106:</b> Authorized disbursements from the Emergency Fund</li> <li>• <b>Presidential Disaster Declaration # 1552:</b> Tropical storm Jeanne / September 14-19, 2004.</li> <li>• <b>Executive Order 2004-64:</b> Declared a state of emergency because of the introduction of a disease called “Sigatoka negra” affecting plantain and banana production.</li> <li>• <b>Executive Order 2004-74:</b> Authorized funds for repairing the Historic Wall of San Juan which collapsed in September of 2004.</li> </ul>	Sila M. Calderón Serra

Year	Policy	Governor
2004 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2004-82:</b> Declared a state of emergency in the municipality of Naranjito and authorized the disbursement of emergency funds to assist residents affected by November 2004 floods.</li> </ul>	Sila M. Calderón Serra
2005	<ul style="list-style-type: none"> <li>• <b>Law 150, December 12, 2005:</b> Authorized, as an exception, the use of up to 10.5% of the maximum balance of 150 million from the Emergency Fund to cover the operational costs of the State Agency for Emergency Management during fiscal year 2005-06. Funds were assigned for the purchase of 20,000 cots, for extending the incident management computer system to all municipalities, to make the system available to Fire Department stations (Total funds = \$4,520,000).</li> <li>• <b>Memorandum Letter 1300-03-06:</b> The Puerto Rico Department of Revenue establishes a procedure for processing and accounting for assistance from the Emergency Fund.</li> <li>• <b>Executive Order 2005-53:</b> Matching Funds for Hazards Mitigation Grant Program. To cover 25% (\$ 525,000) of the total cost of acquiring residences at risk or recently affected by flooding) and to increase the previous allocation of recovery funds to 26,725,000.</li> <li>• <b>Executive Order 2005-62, 63, 65, and 66:</b> Declared the municipalities of Lares, Salinas, Santa Isabel, Ponce, Yauco, Peñuelas, Utuado, Toa Baja, Jayuya, Humacao, Maricao, Aibonito, Moca, Yabucoa, Villalba, Bayamón, and Juana Diaz in state of emergency following heavy rainfall.</li> <li>• <b>Executive Order 2005-69</b> Declared a state of emergency in the municipality of Guayama following heavy rainfall.</li> </ul>	Sila M. Calderón Serra

Year	Policy	Governor
2005 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Presidential Disaster Declaration # 1613:</b> Severe storms, flooding, land/mudslides / October 9-15, 2005.</li> <li>• <b>Executive Order 2005-79:</b> Executive Order to approve the flood insurance rate maps for Puerto Rico and the Code Regarding Special Areas at Risk of Flooding.</li> </ul>	Sila M. Calderón Serra
2006	<ul style="list-style-type: none"> <li>• <b>Law 69, March 10, 2006</b> – Amended article 7 of the 1999 Emergency Management Agency Law. Acknowledges that throughout history marginalized communities have been affected the most in emergency situation and waives all charges for training, workshops, courses, seminars, and/or conferences offered by the State Agency for Emergency Management through non-profit community organizations in designated “special communities”.</li> <li>• <b>Executive Order 2006-04:</b> Authorized the transference of fund to the Governor’s Authorized Representative (GAR) Office to maintain them functioning. At the end of the 2005 fiscal year the following year’s budget had not been approved.</li> <li>• <b>Executive Order 2006-17:</b> Declared the municipality of Aguadilla in state of emergency following heavy rainfall and flooding in March 2006. Allocated up to \$75,000 from the Emergency Fund for this event.</li> <li>• <b>Executive Order 2006-21:</b> Allocated \$7,287,000 for the purchase of Avian flu virus medication.</li> <li>• <b>Executive Order 2006-25:</b> Declared the municipality of Mayagüez in state of emergency following a heavy rainfall event in June 2006 and allocated up to \$701,310.75 for response efforts.</li> </ul>	Anibal Acevedo Vilá

Year	Policy	Governor
2006 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2006-26:</b> Declared the municipality of Aguas Buenas in state of emergency following a heavy rainfall event in June 2006 and allocated up to \$359,333 for response efforts.</li> </ul>	Anibal Acevedo Vilá
2007	<ul style="list-style-type: none"> <li>• <b>Executive Order 2007-07:</b> Declared a state of emergency among cattle breeders in the municipalities of Santa Isabel, Peñuelas, Ponce, Coma, Aibonito, Juana Diaz, Villalba, Salinas, Guayanilla, Yauco , Guayama, Lajas, Cabo Rojo, Guánica, Arroyo and Patillas, and authorized disbursement of up to one million two hundred thousand dollars (\$ 1,200,000) from the Emergency Fund following an episode of drought and wildfires.</li> <li>• <b>Executive Order 2007-13:</b> Declared the municipalities of San Juan, Vega Baja, and Arecibo in state of emergency following a heavy rainfall event in April 2007 and allocated up to \$500,000 from the Emergency Fund for response efforts.</li> <li>• <b>Executive Order 2007-38:</b> Declared the coffee industry in the municipality of Adjuntas, Lares, Jayuya, Utuado, Maricao, Yauco, Las Marías, San Sebastián, Orocovis, and Ciales in state of emergency and allow them to benefit from the funds allocated to respond to the episode of drought and wildfires in summer 2007.</li> <li>• <b>Executive Order 2007-043:</b> Declared community “Reparto Cerca del Cielo” in the municipality of Ponce in state of emergency and allocated up to \$1,760,000 to respond and mitigate the landslides problem in the area.</li> <li>• <b>Executive Order 2007-51:</b> Declared a neighborhood in the municipality of San Sebastián in state of emergency and allocated up to \$5,000,000 to mitigate the</li> </ul>	Anibal Acevedo Vilá

	risk of a bridge collapse to landslides.	
2008	<ul style="list-style-type: none"> <li>• <b>Law 24, March 18, 2008</b> – Protocol for the Mitigation of Landslides Risk in Puerto Rico. Mandates the State Agency of Emergency Management to, in coordination with the Department of Natural Resources, the Environmental Quality Board, the Department of Transportation and Public Works, the Planning Board, and the University of Puerto Rico-Mayagüez, develop and implement a protocol for the mitigation of landslides.</li> <li>• <b>Law 53, May 8, 2008</b> – Amended Law 211 of August 2, 1999 to increase penalties for hindering emergency management activities to up to six months of jail or a \$5,000 fine; including reporting a false alarm, resisting an evacuation order, and obstructing search and rescue efforts, among others.</li> <li>• <b>Law 69, May 23, 2008</b> – Orders an annual emergency evacuation drill program for all government agencies to be coordinated by the State Agency for Emergency Management.</li> <li>• <b>Executive Order 2008-2:</b> Declared the agricultural sector of the municipalities of Yabucoa, Las Piedras, Maunabo, Patillas, Salinas, Santa Isabel, Juan Díaz, Coamo, Barranquitas, Comerío, Corozal, Morovis, Naranjito, Orocovis, Utuado, Adjuntas, Jayuya, Ciales, Lares, Las Marías, and Maricao in state of emergency following severe rainfall in October 2007 and authorized the disbursement of up to \$1,000,050 in assistance to those affected.</li> <li>• <b>Executive Order 2008-12:</b> Declared several road segments in state of emergency following Tropical Storm Olga and allocated \$1,498,208 from the Emergency Fund for response efforts.</li> </ul>	Anibal Acevedo Vilá

Year	Policy	Governor
2008 (Cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2008-30:</b> Amended E.O. 2008-12 to allocate \$387,679 of the funds provided for the Department of Transportation to repair road PR-159 in the municipality of Morovis.</li> <li>• <b>Executive Order 2008-41:</b> Adopted the 2008 Revision of the 2004 State Mitigation Plan for Natural Hazards.</li> <li>• <b>Executive Order 2008-43:</b> Activated the National Guard to evacuate residents affected by a tropical weather disturbance in September 2008 that led to flooding and landslides in the Eastern region of the island.</li> <li>• <b>Executive Order 2008-44:</b> Declared the island of Puerto Rico in state of emergency following a tropical weather disturbance that has led to flooding and landslides throughout the island.</li> <li>• <b>Executive Order 2008-49:</b> Limits the state of emergency declaration in E.O. 2008-44 to the municipalities of Arroyo, Cabo Rojo, Caguas, Culebra, Canóvanas, Fajardo, Guánica, Guayama, Guayanilla, Gurabo, Hormigueros, Humacao, Juana Díaz, Juncos, Lajas, Las Piedras, Loíza, Maricao, Maunabo, Naguabo, Patillas, Peñuelas, Ponce, Sabana Grande, Salinas, San Germán, San Juan, San Lorenzo, Santa Isabel, Villalba, Yabucoa, and Yauco.</li> <li>• <b>Executive Order 2008-50:</b> Declared a state of emergency due to Hurricane Omar.</li> <li>• <b>Executive Order 2008-51:</b> Activated the National Guard to Support the evacuation of those living in at risk areas because of the imminent threat of Hurricane Omar.</li> </ul>	Anibal Acevedo Vilá

Year	Policy	Governor
2008 (cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2008-54:</b> Declares a state of emergency in the municipalities of Lajas, San Germán, Sábana Grande, Cabo Rojo, Añasco, San Lorenzo, Peñuelas, Adjuntas, Hormigueros, Villalba, Yauco, Barranquitas, Corozal, Orocovis, Morovis, Naranjito, Aguada, Aguas Buenas, Las Piedras, Cidra, Patillas, Maunabo, Guayama, Arroyo, Naguabo, Humacao, Luquillo, Fajardo, Ceiba, Río Grande, Yabucoa, and Lares following tropical storm Hanna and allocates 1,190,000 from the emergency fund to assist affected residents and farmers.</li> <li>• <b>Presidential Disaster Declaration # 1798:</b> Severe storms, Flooding / September 21-October 3, 2008.</li> <li>• <b>Executive Order 2008-56:</b> Increase the funds allocated for mitigation works, for the construction of a new access route, and for reestablishing the water service in the community “Reparto Cerca del Cielo” in the municipality of Ponce.</li> </ul>	Anibal Acevedo Vilá
2009	<ul style="list-style-type: none"> <li>• <b>Law 35, July 1, 2009</b> – Amended the 1999 State Agency for Emergency Management and Disaster Administration Law. Assigns the responsibility of developing building evacuation plans for people with impairments to the director of PREMA.</li> <li>• <b>Law 134, November 5, 2009</b> – Added a subsection to Article 7 of Law 211. Requires that PREMA’s director prepares a model emergency response plan to assist neighborhood associations, boards of directors, and/or property managers with the development of their own plan; as required by the Condominium’s Law of 1958.</li> </ul>	Luis G. Fortuño Buset

Year	Policy	Governor
2009 (cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2009-18:</b> Additional funding was granted to cover the road repair costs associated with 2007 tropical storm Olga (\$7,179,712).</li> <li>• <b>Executive Order 2009-24:</b> Declared a state of emergency due to tropical storm Ana.</li> <li>• <b>Executive Order 2009-27:</b> Ordered the disbursement of funds promised in 2008 to the community “Cerca del Cielo” in Ponce, allocated an additional share of \$516,486 to the Department of Transportation to cover any other expenses, and allocated up to \$90,000 for the Waterworks authority to reestablish potable water service.</li> <li>• <b>Executive Order 2009-40:</b> Declared a state of emergency in the municipalities of Bayamón, Guaynabo, Cataño, San Juan, and Toa Baja following an explosion in the Caribbean Petroleum Corporation fuel storage facility on October 23, 2009.</li> <li>• <b>Presidential Disaster Declaration # 3306:</b> Caribbean Petroleum Corporation Explosions and Fires / October 23-26, 2009.</li> <li>• <b>Executive Order 2009-41:</b> Allocated up to 11,000,000 from the credit line of the Emergency Fund for response efforts related to the Caribbean Petroleum Corporation fuel storage facility explosion.</li> <li>• <b>Executive Order 2009-47:</b> Declares a state of emergency in the community of Parcelas Roberto Clemente II in the municipality of Hatillo following a severe weather event in December 2009.</li> </ul>	
2010	<ul style="list-style-type: none"> <li>• <b>Law 164, November 7, 2010</b> – Amended the 1994 9-1-1- Calls Law to officially integrate volunteer civic organizations to the 9-1-1 emergency system.</li> </ul>	Luis G. Fortuño Bursset

Year	Policy	Governor
2010 (cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2010-001:</b> Allocated up to \$350,000 from the credit line of the Emergency Fund to assist those affected in Aibonito by heavy rainfall on December 2009.</li> <li>• <b>Executive Order 2010-021:</b> Allocated up to \$1,000,000 from the Emergency Fund to assist the municipality of Orocovis following severe rainfall on April 2010.</li> <li>• <b>Executive Order 2010-022:</b> Allocated up to \$350,000 from the Emergency Fund to assist the municipality of Utuado following severe rainfall on April 2010.</li> <li>• <b>Executive Order 2010-024:</b> Declared a state of emergency in the municipalities of Coamo, Orocovis, Naranjito, Vega Alta, Vega Baja, Manatí, Dorado, Toa Baja, Arecibo, Barranquitas, and Ponce following severe rainfall on May 2010.</li> <li>• <b>Presidential Disaster Declaration # 1919:</b> Severe storms, Flooding / May 26-31, 2010.</li> <li>• <b>Executive Order 2010-031:</b> Created the Interagency Committee for the “New Safe House” program (Programa Nuevo Hogar Seguro)</li> <li>• <b>Executive Order 2010-035:</b> Declared a state of emergency in the municipalities of Aibonito, Ceiba, Cidra, Corozal, Fajardo, Gurabo, Juncos, Las Piedras, Loiza, Luquillo, Maunabo, Naguabo, Patillas, Río Grande, San Lorenzo, Trujillo Alto, and Vieques following severe rainfall on July 2010.</li> <li>• <b>Executive Order 2010-041:</b> Declared a state of emergency because of Hurricane Earl. Authorized the purchase of necessary resources, places a ban on alcohol, and activated the National Guard.</li> </ul>	Luis G. Fortuño Bursset

Year	Policy	Governor
2010  (cont.)	<ul style="list-style-type: none"> <li>• <b>Executive Order 2010-042:</b> Renewed the flood insurance policies of those families that received federal assistance from the National Flood Insurance Program during Hurricane Georges and are unable to cover the policy costs. By paying for the policies the government secures that the families will receive federal assistance in a future event.</li> <li>• <b>Executive Order 2010-52:</b> Allocated funds from the Emergency Fund to assist those affected by heavy rainfall on October 2010.</li> <li>• <b>Presidential Disaster Declaration # 1946:</b> Severe storms, Flooding, Mud/Landslides, Tropical storm Otto / October 4-8, 2010.</li> <li>• <b>Executive Order 2010-55:</b> Activated the National Guard to provide water to residents of Corozal and Naranjito in response to high levels of water toxicity detected by the Department of Health water sampling system.</li> </ul>	Luis G. Fortuño Burset
2011	<ul style="list-style-type: none"> <li>• Executive Order 2011-001: Created the Emergency Communications Interoperability Committee</li> <li>• Executive Order 2011-003: Establishes a “Fusion” center to facilitate information exchange between the government of Puerto Rico and the U.S. The Center is an initiative of the 2004 Intelligence Reform and Terrorism Prevention Act.</li> <li>• Executive Order 2011-025: Declared the municipalities of Utuado, Camuy, Hatillo, Añasco, San Sebastián, Ponce, Orocovi, Morovis, Naranjito, Barranquitas, Ciales, Corozal, Naguabo, San Lorenzo, Yabucoa, Las Piedras, Río Grande, Caguas, Villalba, and Fajardo in state of emergency following heavy rainfall from May 20 to June 8.</li> </ul>	Luis G. Fortuño Burset

## Appendix D

### HUMAN SUBJECTS REVIEW BOARD APPROVAL



**HUMAN SUBJECTS PROTOCOL RENEWAL**  
University of Delaware

Protocol title: **Technology, Weather Forecasts, and Warnings: Integrating the End User Community**

Current HS number: **HS 08-296**

Principal Investigator: **Havidan Rodriguez; Disaster Research Center**

Advisor (if student):

Other investigators: **Walter Diaz William Donner Jennifer Santos**

Type of review:  Expedited  Full board

Original approval date: **5/18/2004**

Most recent approval date: **1/29/2008**

Approval expires: **1/28/2009**

HSRB Approval Signature <i>Mark Greene PhD, PhD/cp</i>	Approval Date <b>2-15-09</b>
New HS Number <b>HS 09-296</b>	Approval Next Expires <b>2-14-10</b>

1. PROTOCOL STATUS. Please indicate () the status of this project.

**Request protocol continuance**

A.  Active—data collection.

B.  Active—data analysis.

C.  Currently inactive—project was initiated but is presently inactive.

D.  Inactive—project never initiated but anticipated start date is \_\_\_\_\_.

**Request protocol termination**

A.  Inactive—project never initiated.

B.  Completed—no further activities will involve human subjects.

C.  Other (please explain) \_\_\_\_\_.

2. EXTERNAL FUNDING SOURCE

A. Is this project externally funded?  YES  NO

B. If YES, source of funding NSF-ERC

Purpose code DISK432132