12-2018

Local Disaster Planning and Preparedness Coordination in the Rio Grande Valley

Cristina L. Madrid
The University of Texas Rio Grande Valley

LOCAL DISASTER PLANNING AND PREPAREDNESS COORDINATION IN THE RIO GRANDE VALLEY

A Thesis

by

CRISTINA L. MADRID

Submitted to the Graduate College of
The University of Texas Rio Grande Valley
In partial fulfillment of the requirements for the degree of

MASTER OF ARTS

December 2018

Major Subject: Disaster Studies

LOCAL DISASTER PLANNING AND PREPAREDNESS COORDINATION IN THE RIO GRANDE VALLEY

A Thesis
by
CRISTINA L. MADRID

COMMITTEE MEMBERS

Dr. Owen Temby
Chair of Committee

Dr. Dawid Wladyka
Committee Member

Dr. Dongkyu Kim
Committee Member

Dr. Gordon M. Hickey
Committee Member

December 2018

ABSTRACT

Madrid, Cristina, L., Local Disaster Planning and Preparedness Coordination in the Rio Grande Valley. Master of Arts (MA), December, 2018, 73 pp., 9 tables, 11 figures, references, 52 titles.

Hurricanes and flooding events yield complex social and environmental consequences to coastal communities. Disaster preparedness and recovery is a multidisciplinary and multi-jurisdictional effort that requires coordination and planning across many actors.

Existing research recognizes the link between social capital and a community's ability to respond to and 'bounce back' to normalcy after such hazardous events. However, few studies have examined the institutional dimension of social capital among communities noted for high levels of poverty situated in disaster-prone areas along the U.S. Mexico border. We aim to fill this gap by using survey data collected from emergency management practitioners in the Rio Grande Valley by identifying the leadership roles in the network. This exploratory research examines the influence of social capital at the bureaucratic level in creating a hurricane disaster resilient system.

DEDICATION

The completion of my master's studies would not have been possible without the love and patience of my family who wholeheartedly supported me in accomplishing this degree. I would not be where I am today without your encouragement and guidance.

ACKNOWLEDGEMENTS

I would like to extend my gratitude to Dr. Owen Temby, chair of my thesis committee, for all his mentoring and advice. The exposure to his research has been a great influence and inspiration. I am indebted to my committee members, Dr. Dawid Wladyka, Dr. Dongkyu Kim, and Dr. Gordon M. Hickey who provided critical feedback and guided me through research design and data processing. Their advice and comments helped shape this thesis to what it has become.

I would also like to acknowledge the emergency support practitioners who took time to participate in this research. I appreciate everyone's time and input that went into this project. I would also like to thank my professors at UTRGV and at Berea College who have helped me along my academic journey. Their thoughtful guidance and unwavering support are deeply appreciated.

I also want to thank my labmates: Anthony, Jaime, Katia, and Derek for their support. Finally, I would like to acknowledge the National Oceanic and Atmospheric Administration Center for Coastal and Marine Ecosystems and the Educational Partnership Program for supporting this research.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

Hurricanes and flooding events are increasing in frequency, and the Rio Grande Valley of South Texas, like many coastal communities, must prepare for these events that yield complex social and environmental consequences. The *2017 Hurricane Season FEMA After-Action Report* following the response of Hurricanes Harvey, Irma, and Maria, demonstrate that there continues to be room for improvement in preparedness, disaster relief, interoperable communications, community rebuilding, and in other critical functions (Federal Emergency Management Agency, 2018). Disaster preparedness and recovery is a multidisciplinary and multi-jurisdictional effort that requires coordination and planning across many actors. Disasters can be defined as "a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected society to cope using only its own resources" (Manjikian, 2012, p. 51).

Natural disasters are complex events that have become major threats to human life and the world economy. The emergency management and response frameworks can be interpreted as a complex adaptive system as it is "one that changes its state, including its social structure and processes, in response to changing conditions" (Cioffi-Revilla, 2014, p.7). As a result, governmental agencies and nongovernmental organizations recognize the need to adapt to the uncertainties and impacts of natural disasters and are now cooperating to promote regional risk management, locally and at a larger scale to improve the capability to mitigate of such events.

Federal, state, and local governments are engaged in disaster management in varying capacities and roles. The network form of governance is the current system adopted in disaster management (Christophe, 2009). Governance networks have a high degree of uncertainty and complexity. Governance networks are networks where many actors, including public, private and societal groups, are involved and "are connected to each other because of their dependence on the resources or commitments of other actors to realize their aims and/or solve societal problems" (Klijn et al., 2010, p. 194). This system has proven to work well when disasters strike, however many times governmental response fails to operate as planned (Christophe, 2009). Interorganizational emergency management planning and response activities serve an important role in delivering critical information to partners such as real-time situation awareness essential for making informed decisions about search and rescue operations, evacuation routes, shelter locations, or when to make a disaster declaration (Tomaszewski, 2014). Without proper interorganizational and interdisciplinary planning and preparedness, local resources and capacities may be easily overwhelmed, thus cultivating conditions in which resources are allocated inefficiently and social structure is easily stressed.

The United Nations states that since 2000, approximately 1.6 billion people have lost their homes, or suffered other damages from natural disasters (Noy, 2009). The frequency and severity of natural disasters over the last few years has led to even more economic losses and large humanitarian and development challenges at the global scale (UNESCO, 2016). Continued losses in lives and property underscore the primary responsibility of public agencies in making emergency management a central issue in public administration (Comfort et al., 2012). The goal of emergency and disaster preparedness programs is to protect people and property from damage (Watkins, 2000). Failing to mitigate the threats to life and property may be construed as failing to

govern responsibly (McEntire, 2007). Even though hurricanes and earthquakes are 'acts of God,' government officials are often blamed for the destruction if they fail to respond appropriately (McEntire, 2007). Despite the countless efforts in preparedness done in the last thirty years, there continues to be a clear need for public administration research in emergency management (McEntire, 2007).

The Rio Grande Valley is situated on the northern bank of the Rio Grande river and juxtaposes the Gulf of Mexico and the Mexican state of Tamaulipas. Flooding, hurricanes, and tropical storms are ranked as the highest threats to people and assets in the Rio Grande Valley (Cameron County, 2015). Floods typically occur in the Rio Grande Valley occur due to the flat terrain and slow runoff, causing surface water build-up that cannot flow quickly (Texas Department of Public Safety, 2013). Tropical storms can lead to "heavy rain, localized flooding, high tides, localized coastal erosion, and minor wind damage" (Texas Department of Public Safety, 2017, p. 36). Hurricanes which exhibit wind speeds of 74 mph or more can also lead to heavy rain, localized flooding, high tides, localized coastal erosion, and major wind damage (Texas Department of Public Safety, 2013).

The four-county region, consisting of Hidalgo, Cameron, Willacy, and Starr counties. is one of the fastest growing regions in the United States. Cameron County nearly doubled its population from 209,727 1980 to 407.677 in 2010 (US Census Bureau, 2016). Likewise, Hidalgo County's population has also significantly increased by 175% -- from 283,323 in 1980 to 779.271 in 2010 (US Census Bureau, 2016). Today, Rio Grande Valley region has a population of approximately 1.3 million residents and is consistently ranked amongst the most economically disadvantaged region in the United States (Census Bureau, 2016; Texas Department of Public Transportation, 2016). The Rio Grande Valley is designated as a region with a high social

vulnerability index (SVI). Social vulnerability refers to the socioeconomic and demographic factors that affect the resilience of communities (Flanagan et al., 2011). The SVI is calculated based on housing, transportation, social economic status, race, ethnicity, language, and household composition. Much of the population of Cameron, Hidalgo, Starr, and Willacy counties are within the top two quartiles of social vulnerable counties to environmental hazards in the nation (Cutter and Finch, 2008).

Increased population growth and urbanization along coastal areas increases human exposure and vulnerability to hurricanes and coastal flooding. The increase in economic losses is a result of further development in coastal areas, increased real estate values, and high vulnerability of modern societies and technologies (Smolka, 2006). A principal reason for these increased losses is the continuing economic development in hazard-prone areas. Eighteen of the 20 most costly events have occurred since 1990 (Wharton Risk Center, 2008). All but one of the events in the top 20 were natural disasters, apart from the 9/11 attacks. More than 80 percent of these were weather-related events: hurricanes and typhoons, storms, and floods, with nearly three-quarters of the claims in the United States (Wharton Risk Center, 2008).

As the coastal population of the Rio Grande Valley continues to grow (US Census, 2016), local community administrators will have to make informed decisions about the economic and environmental demands of limited coastal space use and mitigate the vulnerabilities associated with the increased development and its impacts of natural and human-induced hazards. This is especially critical given that the scale, intensity, and cost of the impacts of disasters are on the rise and continue to increase (Tomaszewski, 2014).

The probability of a disaster striking given the region's vulnerability and proximity to the coast and an international border justifies the need to understand approaches for risk planning

and management of natural disasters. It is therefore important to analyze and evaluate the role of local emergency management networks and organizations particularly in regions with a high social vulnerability index such as the Rio Grande Valley. A determinant of the degree of a community's ability to bounce back to normalcy after such hazardous events are social capital; a social dimension of resilience.

The emergent use of networks in public policy, particularly in emergency management, is a driver of social capital and community resilience. Many communities lack expertise, time, and financial resources to fully and successfully implement a pre-disaster mitigation program. The literature reveals that the response network works best when entities have a pre-incident working relationship with one another based on trust and frequent contact (Jensen & Waugh, 2014). Trust is an important concept in situations of high uncertainty (Klijn et al., 2010). The literature recognizes that "trust has a beneficial effect on cooperation in alliances and that actors in alliances cannot rely only on contracts" (Klijn et al., 2010, p. 194). Network scholars recognize that formal and informal networks are also important dimensions in collaborative networks (Isett et al., 2011). Existing research recognizes the link between social capital and a community's ability to respond to and 'bounce back' to normalcy after hazardous events. However, few studies have examined the institutional dimension of social capital among fast-growing communities noted for high levels of social vulnerability situated in disaster-prone areas along the U.S. Mexico border. With this study, we aim to fill this gap by using survey data collected from emergency management practitioners in the Rio Grande Valley by identifying the leadership roles in the network. This exploratory research examines the influence of social capital at the bureaucratic level in creating a hurricane disaster resilient system.

Chapter 2 examines the policy context and relevant literature in disaster preparedness. This chapter provides a brief review of emergency management policy at different levels of government and social science concepts relevant to this study. Chapter 3 presents our methodology. Here we present our research questions and how we operationalize relevant concepts for the development of our survey instrument. Chapter 4 describes our results and includes qualitative data from the semistructured interviews. Chapter 5 concludes with a discussion of our findings and opportunities for future research.

CHAPTER II

POLICY CONTEXT AND RELEVANT LITERATURE

It has been documented that the scale, intensity, and cost of the impacts of natural disasters are on the rise and continue to increase (Tomaszewski, 2014). Local emergency management and response agencies are often not fully integrated in networks for emergency management planning and response activities, which can be a major pitfall since these networks serve an important role in delivering critical information to partners such as real-time situation awareness essential for making informed decisions about search and rescue operations, evacuation routes, shelter locations, when to make a disaster declaration, etc. (Tomaszewski, 2014). Without proper inter-organizational planning and preparedness, local resources and capacities may be easily overwhelmed, and thus cultivate conditions in which social structure and organizations are easily stressed.

The Rio Grande Valley has a population of approximately 1.3 million residents residing in Cameron, Hidalgo, Willacy, and Starr counties (US Census, 2016). 91% of the local population is of Hispanic origin and is consistently ranked amongst the most economically disadvantaged region in the state United States (Census Bureau, 2016; Texas Department of Public Transportation, 2017). It is important to analyze and evaluate the role of local emergency management networks and organizations particularly in regions with a high social vulnerability index such as the Rio Grande Valley. Effective responses to large-scale natural disasters and other threats require efficient coordination efforts among individuals and agencies from

multidisciplinary backgrounds. Effective integration and collaboration among emergency management practitioners in the Rio Grande Valley can be valuable and beneficial to all phases of the disaster cycle: mitigation, preparedness, response, and recovery. Often, it is the lack of communication and coordination that is cited as a major setback for a successful response to a large-scale event.

One must note that disasters are handled by local officials and agencies first and tend to end locally as well. State and federal agencies join the response when local capacities are overwhelmed. Disaster declarations by certain governing officials need to be made in order for certain resources to be unlocked. The President cannot declare a major disaster until a request has been turned in by the governor of the state. Congress plays two important roles in disasters: funding recovery efforts and providing oversight (Mycoff, 2007). Typically, Congress provides emergency funding for first-response agencies such as FEMA (Mycoff, 2007).

FEMA is primarily a resource-management agency. FEMA's mission is "to support our citizens and first responders to ensure that as a nation we work together to build, sustain and improve our capability to prepare for, protect against, respond to, recover from and mitigate all hazards" (Mckenzie et al., 2016, p. 445). Hazards are "natural, anthropogenic, or technological occurrences that can cause damage to humans, especially when people fail to prepare for them or actually increase risk by ignoring warnings or increasing exposure" (Cioffi-Revilla, 2014, p. 7). Therefore, the probability of experiencing a disaster is tied to how well a community mitigates its hazards. As a result, some of FEMA's responsibilities include working at disaster sites and disseminating preparedness information to the public. FEMA, which evolved from the Civil Defense agency during the cold war era, was established by the Stafford Act in 1979 "to bring together disparate disaster functions into one agency" (Birkland & Waterman, 2008, p. 696).

Grants, low-interest loans, and tax benefits from the federal government are made available to individuals or small businesses that are not insured or are underinsured as well as to cities and local governments in need of financial assistance. Responding to a disaster in many cases is a costly event for resident and local governments. Special monetary assistance is given to states upon declaration of a 'major disaster' made by the President. The correct documentation may call for a full or, in most cases, a partial reimbursement. The House and Senate then determine the amount of aid that will be made available for the local governments to use in assistance with the severely damaged areas (Kovacs & Kunreuther, 2001).

Marking a clear definition of how mitigation may be formulated to address areas of critical infrastructure and key resource allocation planning to decrease the vulnerability of life and property is a problem itself for various agencies present different approaches to achieving an effective mitigation solution. Congress is ultimately responsible for structuring national emergency management and facilitating the relationship between federal, state, and local governments (Mycoff, 2007). Under the Stafford Act of 1988, the states are responsible for planning for and responding to natural disasters, but when a disaster exceeds a state's capacity to respond, the governor may ask the president to make a formal declaration of major disaster or emergency, thereby allowing the federal government to aid (Mycoff, 2007). Problems that may surface as a result of inefficient mitigation due to inadequately or vaguely assigning responsibilities to various federal, state, and local agencies post a natural disaster, may lead to a lengthy and time-consuming recovery, sometimes lasting several years.

Emergency management is an interdisciplinary field that covers areas of public administration, economics, business administration, political science, psychology, history, medicine, civil engineering, and sociology to name a few (McEntire, 2007). It is a newly

explored discipline gaining research interest as a result of the increases in number, size, and scope of disasters in the United States and globally (Comfort et al., 2012). The number of public administration researchers involved in disaster policy and emergency management research is relatively small compared to academics in other social science disciplines (McEntire, 2007). It has been documented that public administration officials "have been relatively slow to address the organizational issues in emergency management and the policy dilemmas resulting from the complex intergovernmental context of disaster policy and emergency management" (Waugh, 2007, p. 161).

Disaster Cycle

The disaster cycle may be summarized as the many tasks and functions of emergency management. It consists of four phases: preparation, response, recovery and mitigation. The disaster cycle is an established paradigm that researchers and disaster management practitioners at all levels of government use to understand the different phases of a disaster (Tomaszewski, 2014).

The disaster cycle is commonly utilized for planning and responding to disasters throughout emergency management offices from local jurisdictions to the national and international levels. Figure 1 below illustrates the disaster cycle and its four stages of disaster: mitigation, preparedness, response, and recovery.

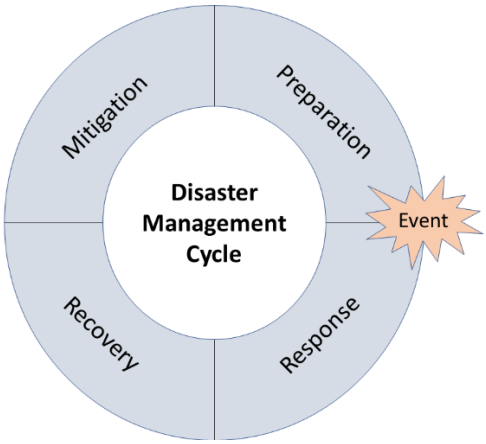

Figure 1: The Disaster Cycle

The preparedness phase is “where training, exercises, planning and educational activities for both the public and responders are conducted” (Madry, 2015, p. 13). Preparation is the single most important element in reducing losses from catastrophic events. Even though a proper response can reduce economic losses and losses in terms of life, a lot of the reduction takes place before the disaster ever occurs.

Response begins as soon as disasters strike. Response is “where immediate efforts are made to minimize the hazards, conduct search and rescue, open and manage shelters, provide public information, distribute food and supplies, provide medical assistance, and generally deal with the immediate situation as quickly and effectively as possible” (Madry, 2015, p.13).

Recovery or rebuilding services transportation systems and infrastructure, including utilities, communication, after a disaster may take years. The recovery phase begins “when efforts are made to return the community, environment, and economy back to normal” (Madry, 2015, p. 13). The mitigation phase is “where lessons learned are discussed, the response is evaluated, and steps are taken to minimize the effects of the next disaster” (Madry, 2015, p. 13). Risk reduction is the goal of all hazard mitigation efforts (FEMA, 2017).

Hazard mitigation may take up in many forms. Hazard mitigation programs set forth by FEMA include the National Flood Insurance Program, floodplain management, flood mapping, flood insurance, and the national hurricane program.

At the personal scale, mitigation efforts consist of costly investments. By examining the disaster of Hurricane Katrina, Kunreuther found that the extremely elevated costs associated with the catastrophe were enough evidence of the natural disaster syndrome – the 'it will not happen to me' (Kunreuther, 2008). Many individuals suffered severe losses from flooding as a consequence of not having flood insurance coverage and therefore, not having their homes properly mitigated against risk. Kunreuther points out that individuals not only feel that events such as Katrina will not happen to them but also have a false sense of security from measures, like levees, taken to protect the areas from disaster (Kunreuther, 2008). Individuals generally underestimate the risk and seem to only focus on their short-term financial situation in overlooking cost-effective mitigation. Significant reductions in future disaster losses can be obtained by educating communities about effective ways to strengthen existing structures better-designed future structures. Additional disaster management activities are depicted in Table 1.

Table 1: Example of Disaster Management Activities

Disaster management phases	Activities
Mitigation	Prohibiting or limiting floodplain development Remove existing structures from flood hazard areas
Preparation	Risk analysis Determine travel routes for evacuation Trainings/exercises
Response	Actions taken to save lives and prevent further property damage Recording extent of damages Coordinating resource management
Recovery	Actions taken to return to normal or a safer situation Getting financial assistance to help pay for the repairs

Federal Agency Role

Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) to show its ongoing support for reducing the rising cost of disasters through hazard mitigation. The DMA 2000 amends the Robert T. Stafford Disaster Relief and Emergency Assistance Act (FEMA, 2017). One of the widespread misconceptions “among citizens, journalists, and some members of Congress is that the federal government, under the Stafford Act, is primarily responsible for disaster relief and recovery services” (Birkland & Waterman, 2008, p. 696). Through the Stafford Act, Congress aims "to provide an orderly and continuing means of assistance by the federal government to state and local governments” (Birkland & Waterman, 2008, p. 697)

The Disaster Mitigation Act of 2000 calls upon states to “coordinate State and local government activities related to hazard mitigation, prepare and submit a State Mitigation Plan and update every 3 years as a condition for receiving certain forms of disaster assistance, make available funds for assisting local jurisdictions with hazard mitigation planning and projects, and provide technical assistance and training to local governments in developing hazard mitigation plans, and in applying for and managing hazard mitigation grants for planning and for projects” (FEMA, 2017). Likewise, local governments are tasked with “preparing and adopting a jurisdiction-wide natural hazard mitigation plan as a condition of receiving post-disaster grants for hazard mitigation” and are also asked to review the hazard mitigation plan and update it every 5 years if necessary (FEMA, 2017).

The Disaster Mitigation Act of 2000 requires emergency management practitioners to identify the community’s critical facilities and estimate potential risk. Local hazard mitigation plans incorporate Geographic Information System (GIS) data and analysis to develop outputs to

better understand the geophysical hazards of a specific region to better implement the essential activities for each phase of the disaster cycle.

The DMA 2000 encourages reducing the rising cost of disasters through hazard mitigation. Several communities throughout the Rio Grande Valley have developed their own hazard mitigation plans in partnership with state agencies (Cameron County, 2015; Hidalgo County, 2016). By adopting a mitigation plan, these communities can maintain eligibility to receive FEMA funds when disasters strike. The plan encourages community participation to better understand and successfully implement local concerns and mitigation actions (McClain, 2016).

The National Incident Management System (NIMS) developed by the US Department of Homeland Security sets a common standard for incident management applicable at all jurisdictional levels and across functional disciplines for the nation. NIMS guidance can be applied “across a full spectrum of potential incidents, hazards, and impacts regardless of size, location or complexity” and are intended to “improve coordination and cooperation between public and private entities in a variety of incident management activities” (Farazmand, 2014, p. 280). Local, state, territorial, and tribal nation jurisdictions are required to adopt NIMS as a condition to obtain federal preparedness grants and awards (Department of Homeland Security, 2017).

As per NIMS, all incidents begin and end locally meaning that local responders are typically the first to arrive at an incident scene and the last to vacate. Much of the emergency planning and mitigation is done by local and state agencies. Federal agencies are available to support local and state agencies when resources are overwhelmed (FEMA, 2011). NIMS sets the stage for players to coordinate in order to execute an effective response.

State Agency Role

The Texas Division of Emergency Management (TDEM) is a division within the Texas Department of Public Safety (DPS). DPS' mission is to protect and serve Texas and its vision is to proactively protect the citizens of Texas in an ever-changing threat environment while always remaining faithful to the U.S. and State Constitution.

Texas Government Code Chapter 418 *Emergency Management* dictates the specific responsibilities assigned to TDEM. TDEM is responsible for "carrying out a comprehensive all-hazard emergency management program for the State and for assisting cities, counties, and state agencies in planning and implementing their emergency management programs… that includes pre- and post-disaster mitigation of known hazards to reduce their impact; preparedness activities, such as emergency planning, training, and exercises; provisions for effective response to emergency situations; and recovery programs for major disasters" (Texas Department of Public Safety, 2017). These responsibilities can be broken down into: "preparing and keeping an up to date state emergency management plan, assisting in development of local plans, train temporary personnel to keep as reservists to support during a disaster, get in contact and recruit private aviators and civil air patrol to assist during a disaster, contact and establish relationships with Texas Department of Transportation to determine methods for communications and disseminating emergency public service messages, monitor the weather for possible incoming storm that may lead to a disaster, develop and enact a phased reentry plan, and establish good communication with different coordination groups throughout the state and local that will be essential during a disaster" (Texas Department of Public Safety, 2017).

TDEM has programs that increase public awareness about disasters and hazards that could possibly hit their area. They issue pamphlets and work with other organizations to ensure that during a disaster a plan is available to lessen the damage and casualties. Prior to disasters, they coordinate various specialized trainings for emergency responders and local officials to ensure they are prepared for a disaster.

County Emergency Management Role

Texas Government Code Chapter 418 also specifies the emergency management role and responsibilities of county and city jurisdictions. The Office of Emergency Management (OEM) maintains an emergency management program for its jurisdiction and "coordinates disaster mitigation, preparedness, response, and recovery with state and federal emergency management personnel" (Texas Government Code, 2013). During a disaster declaration, the OEM acts as a middleman between cities/counties and the state in disaster events.

Local agencies adopt NIMS and DHS FEMA guidance. Mutual aid agreements are enforced by local agencies for coordination during a response. The County Judge (or city mayor) is designated as the emergency management director and serves as the governor's designated agent in the administration and supervision of emergency management duties. He/she may designate a person to serve as emergency management coordinator who shall serve as an assistant to the emergency management director for emergency management purposes. Additionally, the County Judge has the power to declare a local state of disaster and may order the evacuation of all or part of the population if necessary. City mayors and county judges have the authority to make jurisdictional disaster declarations when local resources are stressed to request further assistance from the state.

The mission of the Cameron County OEM is to "support County and local governments in the areas of prevention, preparedness, emergency planning, response, and recovery from man-made or natural disasters" (Cameron County, 2018). The Hidalgo County OEM is responsible for "the county's emergency plans and annexes, educating the public about emergency preparedness via different means, responding to disasters, maintaining the Special Needs Population roster, assisting Home Health Agencies and Adult Day-Care Facilities with their emergency response plans, and coordinating with local cohorts at the municipal level, neighboring counties, and at the State level" (Hidalgo County, 2016). The Offices of Emergency Management of both Cameron and Hidalgo Counties indicate that they support their jurisdictions during disasters and aim to prepare their citizens as best they can to lessen damage to both property and people.

The *Hazard Mitigation Action Plan for the Rio Grande Border*, the *Cameron County Hazard Mitigation Plan*, and the *Hidalgo County Hazard Mitigation Plan* identify several hazards in the Rio Grande Valley. The Hazard Mitigation Action Plan for the Rio Grande Border "was prepared by cities and counties in a 14-county region under the auspices of Texas A&M International University and the non-profit Rio Grande Institute, with planning and technical assistance from H2O Partners, Inc" (Rio Grande Institute, 2008, p. 22). The Cameron County Hazard Mitigation Plan was prepared by Cameron County and H20 Partners, Inc, a consulting firm that provides technical support and oversees the development of the Plan (Cameron County, 2015).

Influence

Influence can be defined as "pressures that get someone to do something they would not otherwise do when this 'someone' acts in a conventionally voluntary manner" (Turner, 2006, p.

290). Certain positions within networks exert significant influence and shape relations among actors depending on network position. Social network analysis (SNA) will be utilized to determine the extent of influence agencies have in local preparedness planning. Actors will be identified through local emergency management offices and planning material available on the web. Through SNA, we can examine communication among emergency planners and local organizations/agencies, view partnerships for all-hazards planning, and get a sense of who gets contacted for guidance and expertise (Harris & Clements, 2007).

Adaptive co-management is an emerging approach to improving "our understanding of, and ability to respond to, complex social-ecological systems" through learning and collaboration which instill trust building (Armitage, 2009, p. 95). This interdisciplinary approach encourages flexible social arrangements to influence "ecosystem management outcomes in a complex and uncertain world" (Armitage, 2009, p. 95). The command-and-control paradigm is being overshadowed by a new, flexible governance approach which combines aspects of co-management and adaptive management that emphasizes "group decision making that accommodates diverse views, shared learning, and the social source of adaptability, renewal and transformation" (Armitage, 2009, p. 96). Adaptive co-management has the necessary practices, such as "an emphasis on trust building, institutional development, and social learning" to make social-ecological systems resilient, or more robust, to change (Armitage, 2009, p. 96). Policy participants coordinate their behavior with allies in advocacy coalitions to influence policy.

Stern and Baird (2015) expand on the different types of trust and how they interact to influence of natural resource management institutions. They propose a general theory of institutional resilience that can be broadly applied to emergency management. How resilient a community is, constitutes its adaptive capacity, particularly its capacity to learn and make the

intentional adjustments to shape change, especially to address complex challenges. Additionally, Stern and Baird explore the concept of a trust ecology which focuses on the interactions between trust types and functions within institutional settings.

In another study, Klijn et al., explored whether trust influences outcomes and if levels of trust improve as a result of active network management. By exploring the relationship between trust and outcomes, the authors' research indicated that "trust has a strong effect on the perceived process outcomes" (Klijn et al., 2010, p. 206) and that "the greater the number of [network] strategies used, the higher the level of trust" (Klijn et al., 2010, p. 210).

Collaboration in Emergency Management Activities

Our research focuses on the bureaucratic perspective of the preparedness network in the Rio Grande Valley. Because natural disasters affect several facets of social life, complex interactions among a large number of actors must take place. The public management framework is the current system adopted in disaster management. It is a multiorganizational arrangement responsible for solving problems that cannot be achieved, or achieved easily, by single organizations. Theoretical components of cooperation within the networks that we touch on with this study include leadership and influence.

We can see the framework, or the complex web of interactions, in practice in Table 2 which delineates some of the disaster related roles by level of government. Federal and state government resources are tapped when locals are overwhelmed. State-level organizations act as an intermediary in helping locals "implement federal policies, training communities in best practices, and funneling federal grant monies" (McEntire & Dawson, 2007, p. 58). Locals are responsible for devising local emergency management policy and implementing programs that

will reduce vulnerability and improve multi-organizational coordination in their communities as well as coordinating disaster mitigation, preparedness, response, and recovery with state and federal emergency management personnel (Texas Government Code, 2013). We can see how the governance structures in place encourage coordination. Preparedness requires horizontal and vertical integration of multiple agencies for preparation and response of an incident. It is a complex institutional social system that requires trust and leadership to be resilient and have the adaptive capacity to function when faced by a severe disturbance.

Coordination and networking are essential for emergency management practice given the number of diverse actors involved in developing its various activities. The currently implemented system provides a coordination framework for local, state, and federal levels of government to interact with each other which is reflected in the way in which emergency management activities are shared among local, state, and federal levels of government. Table 2 shows the varying emergency management roles of national, state, and local governments in the United States.

Table 2: Emergency Management Role by Level of Government

Level of Government	Role in Emergency Management
Federal	• Provides national guidance and eligibility criteria for federal funding. • Provides assistance when resources are overwhelmed at the local and state level. • Responsible for emergency management plans for federal jurisdictions.
State	• Required to adopt NIMS and ICS as a condition to obtaining federal preparedness grants and awards (Haddow, 2017). • Acts as an intermediary in helping locals “implement federal policies, training communities in best practices, and funneling federal grant monies” (McEntire & Dawson, 2007, p. 58). • Responsible for emergency management plans for state jurisdictions.

Local	• Required to adopt NIMS and ICS as a condition to obtaining federal preparedness grants and awards (Haddow, 2017). • Responsible for devising local emergency management policy and implementing programs that will reduce vulnerability, limit the loss of life and property, protect the environment, and improve multi-organizational coordination in their communities (McEntire & Dawson, 2007). • Must maintain an emergency management program for its jurisdiction and "coordinate disaster mitigation, preparedness, response, and recovery with state and federal emergency management personnel" (Texas Government Code, 2013).

Through this division, we see that the local government, such as municipalities, are responsible "for the success of mitigation, preparedness, response, and recovery efforts," while states act as intermediaries "helping to implement federal policies, training communities in best practices, and funneling federal grant monies," and federal agencies provide substantial financial resources to states and local governments to encourage them to support national programs (McEntire & Dawson, 2007, p. 58).

The Incident Command System (ICS) is a scalable "management system designed to enable effective and efficient domestic incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure" (Jensen & Waugh, 2014, p. 6). This system is designed in such a way that allows people from different organizations and backgrounds to work together effectively during a response by providing "procedures for controlling personnel, facilities, equipment, and communications" (Arnold, 2012, p. 135). ICS is the nationally recognized response system mandated by the federal government for first responders to utilize when responding to an incident. All incidents begin, and end locally and therefore states and local authorities have total command of the incident. Much of the emergency planning and mitigation is done by local and state agencies. The federal government is available to provide assistance when resources are

overwhelmed at the local and state level. Local, state, territorial, and tribal nation jurisdictions are required to adopt NIMS as a condition to obtaining federal preparedness grants and awards. ICS and NIMS are both integrated systems that allow for efficient and effective responses from a diverse pool of entities to work together seamlessly and establish a unified command during an incident, regardless of its size, scope, or cause.

The disaster research community recognizes that a diverse array of pre- and per-incident factors influence the success of ICS implementation (Jensen & Waugh, 2014). One of those important factors is the response network. Regarding the response network, ICS works best when entities have a pre-incident working relationship with one another based on trust and frequent contact (Jensen & Waugh, 2014). Societal resilience is deepened through the cooperation developed between parties that allows the affected community to return to normalcy faster because of better coordination and reduced duplication of effort (Busch & Givens, 2013).

A public management network "typically refers to multiorganizational arrangements [which are led or managed by government representatives] for solving problems that cannot be achieved, or achieved easily, by single organizations" (Agranoff & McGuire, 2001, p. 296). Networking with other individuals and groups supports flexibility, diversity, and redundancy. An efficient disaster coordination among all parties facilitates multiorganizational collaboration, which is important in the effectiveness of disaster mitigation, preparation, response, and recovery. Trust is an important and required element and is essential in holding public networks together (Agranoff & McGuire, 2001). Leadership is another essential element identified in the public network management literature that contributes to the cohesion of the network (Agranoff & McGuire, 2001). Power also plays a role in public network management and can be defined as "a property that either prevents or facilitates action" (Agranoff & McGuire, 2001, p. 315). One

critical dimension of power observed in collaboration is the "ability to exercise influence or authorize action" (Agranoff & McGuire, 2001, p. 316).

Formal networks refer to "multi-actor arrangements explicitly constituted by public managers to produce and deliver public services," typically produced in the form of contracts, memoranda of understanding, and mutual aid agreements (Isett et al., 2011, p. 162). In contrast, informal networks "tend to be emergent structures used for information sharing, capacity building, problem-solving, and service delivery" that do not bind members through formal means (Isett et al., 2011, p. 165). Informal networks are important in building relationships and developing trust which can later formalize and be beneficial in securing contracts and grants (Isett et al., 2011).

Because local governments have substantial responsibility for emergency management in their communities, they differ with respect to policies and organizational arrangements of how emergency management is organized and undertaken based on their identified hazards and vulnerabilities. Emergency management networks can strengthen multi-organizational, intergovernmental, and inter-sector coordination through several mediums such as joint planning, memoranda of understanding and mutual aid agreements; the Incident Command System; the National Response Plan; and the National Incident Management System (McEntire & Dawson, 2007). These means of coordination encourage vertical and/or horizontal integration to eliminate fragmentation, gaps in service delivery, and duplication of service (McEntire & Dawson, 2007). Federal grants encourage emergency managers to engage in joint planning to identify hazards and vulnerabilities to mitigate disasters and engage in memoranda of understanding and mutual aid agreements with various local government departments, community organizations, and other levels of government to improve interagency, intersectoral, or interjurisdictional assistance and

coordination. Therefore, emergency management practitioners are encouraged to engage in activities that strengthen ties between organizations before disaster strikes (McEntire & Dawson, 2007).

Resilient Communities

One of the goals of preparedness is to create resilient communities. Resilience can be defined as "a measure of the capacity for a complex system to maintain a desirable state when perturbed by extractive uses… and more broadly is the degree to which a social–ecological system is capable of self-organization, learning, and adaptation" (McLaughlin & Krantzberg, 2012, p. 40). Resilience is simply the ability of a social system to respond and recover from disasters. A component of resilience in the social sciences is social capital. Social capital refers to the "features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putnam, 1995, p. 67).

The concept of social vulnerability identifies sensitive populations that may be less likely to respond to, cope with, and recover from a natural disaster. It is a multidimensional concept that examines social dimensions of vulnerability. Race/ethnicity, socioeconomic class, and gender "are among the most common characteristics that define vulnerable populations, along with age (elderly and children), migration, and housing tenure (renter or owner)" (Cutter & Finch, 2008, p. 2301). High concentrations of social vulnerability to environmental hazards run along the U.S.–Mexico border counties. To improve emergency management, it is important to recognize the extent of vulnerable populations exposed to hazards in order to develop place-based emergency plans accordingly and increase resilience (Cutter & Finch, 2008).

In the network scope, learning is a central element of resilience, particularly double-loop learning processes “that institutionalize learning in policy, as these will be required to overcome pathologies in management and maintain resilience” (McLaughlin & Krantzberg, 2012, p. 40). Prior studies acknowledge a gap in network research as it applies to the influence of social capital at the bureaucratic level. This research proposal aims to contribute to that research with a local perspective of in creating a hurricane disaster resilient system in the Rio Grande Valley.

CHAPTER III

METHODOLOGY

The research method proposed included administering an online survey and semi-structured interviews to civil servants who are instrumental in emergency management activities in the Rio Grande Valley and who hold positions in either local, state, federal, university or non-profit organizations. The study was approved by the Institutional Review Board for Human Subjects Protection at the University of Texas Rio Grande Valley. Prior to data collection, the principal investigator and assistant researchers completed CITI training courses for Human Subjects Protection and Responsible Conduct of Research. Informed consent was obtained from all participants. Participants did not receive any monetary incentives for participating in the survey.

Research Questions

A particular interest of this study is the extent to which civil servants from different organizations interact within the Rio Grande Valley preparedness network and how some dimensions of social capital are present among these working relationships. The research questions for this case study are the following:

1. Who comprises the Rio Grande Valley disaster preparedness network?
2. How does communication manifest itself in the Rio Grande Valley? With what method and frequency?

3. What is the distribution of influence throughout the network?
4. To what extent do RGV-based practitioners collaborate with other organizations in the region including neighboring Mexican counterparts?

To answer these questions, we disseminated an online survey and conducted semistructured interviews with public stakeholders involved at any capacity with emergency support functions. We used purposive sampling for both surveys and interviews and snowball sampling with semistructured interviews to identify study participants. Participation was limited to the length of the survey and the semi-structured interview. Participants for both surveys and interviews were identified from the examination of public records, agency web pages, and meeting minutes. Interview participants held leadership roles in federal, state, local, and nonprofit organizations.

Thirty agencies were selected, and they solely included US-based organizations, representing federal, state, and local agencies, as well as higher education and nonprofit/NGO organizations such as The National Oceanic and Atmospheric Administration, the U.S. Army Corps of Engineers, Texas Department of Emergency Management, Texas Department of Health and Human Services, Cameron County, Hidalgo County, the American Red Cross, and the Rio Grande Valley Food Bank, to name a few. Recruitment of survey participants was done through formal email invitations to emergency management representatives that have participated in local preparedness activities such as plan development and exercises identified through local emergency management offices and planning material publicly available. The email invitation introduced the study and provided participants with the survey's web link. The survey was conducted using the Qualtrics online survey tool provided by the University of Texas Rio Grande Valley between October and November 2018.

Survey content included questions about where participants work, the nature of their work with others, and who they interact with. For a full list of interview questions and selected agencies, refer to the Appendix. We also collected information about communications through formal and informal channels how communications with persons of selected organizations have led them to rethink their approach to hurricane preparedness. Quantitative data collected from the survey were statistically analyzed using SPSS and STATA. Spatial data was analyzed using the mapping capabilities of Excel. Descriptive statistics for frequencies and crosstabulations were analyzed mostly on SPSS.

Semistructured interviews were partially transcribed provided us with qualitative data that gave context to the survey findings. Therefore, a specific methodology was not applied in analyzing interview data. Interview content also included questions about where participants work, the nature of their work with others, and who they interact with. Semistructured interviews were also conducted between October and November 2018. A modified snowball sampling was used in which participants were able refer us to other informants. The semi-structured interview questions were used as tool to probe for more specific information derived from the survey. We triangulated the survey results with the analysis of the semi-structured interviews.

To answer research question 1, we asked participants what organization they work for. Table 3 shows the question as prompted by the survey and selection options. Organizations were divided into five groups: federal, state, local, NGOs, and university. Texas Sea Grant was added to the University section due to them being headquartered at Texas A&M University and their role in research. We also provided the option for participants who work at other organizations that were not listed to participate in the study by allowing them to select ‘other’ where they then were prompted to a follow up question that allowed them to fill in their organization’s name.

Table 3: Operationalization of Research Question 1	
Survey Question	Scale
What organization do you work for? (Select one) <u>Federal Organizations</u> 1. CBP – Customs and Border Patrol (DHS agency) 2. EPA – Environmental Protection Agency 3. FEMA – Federal Emergency Management Agency (DHS agency) 4. NWS – National Weather Service (NOAA agency) 5. NOAA – NOAA (other than NWS and OCM) 6. OCM - National Hurricane Center (NOAA agency) 7. USACE – US Army Corps of Engineers <u>State Organizations</u> 8. TAHC - Texas Animal Health Commission 9. DADS – Texas Department of Aging and Disability Services 10. TDEM - Texas Department of Public Safety / Texas Division of Emergency Management 11. DSHS - Texas Department of State Health Services 12. TXDOT - Texas Department of Transportation 13. TGLO - Texas General Land Office <u>Local Organizations</u> 14. CC - Cameron County 15. COB – City of Brownsville 16. COH – City of Harlingen 17. SPI – City of South Padre Island 18. COM – City of McAllen 19. COW – City of Weslaco 20. CBRAC – Coastal Bend Regional Advisory Council 21. HC – Hidalgo County 22. LRGVDC – Lower Rio Grande Valley Development Council 23. POB – Port of Brownsville / Brownsville Navigation District 24. WC – Willacy County <u>NGOs</u> 25. ARC – American Red Cross 26. GOMA – Gulf of Mexico Alliance 27. RGVFB – Rio Grande Valley Food Bank 28. SA – The Salvation Army <u>University Institutions</u> 29. TSG – Texas Sea Grant 30. UTRGV - University of Texas Rio Grande Valley <u>Other</u> 31. OR – Other	One choice drop-down menu
If Other organization; What organization do you work for?	Free response textbox

To answer research question 2, participants were asked to select all the listed agencies they communicate with. The listed agencies that participants were able to select included all agencies listed from Table 2 with exception of other. For each agency selected, a follow up question asked them to rate on a three-point Likert scale (never, occasionally, or regularly) how often they communicate with those selected agencies through formal channels (e.g. committee meetings, memos, official verbal or written business communication) and informal channels (e.g. chance conversations, spontaneous meetings, personal notes, emails and phone calls, drinks after work). Table 4 shows the questions as prompted by the survey and selection options.

Table 4: Operationalization of Research Question 2

Survey Question	Scale
Select all the following federal, municipal, county, state, and nonprofit agencies you communicate with in your professional role - even if you only communicate with them occasionally.	Multiple selection menu
Regarding work-related matters, how often do you communicate with people in the following organizations through formal channels (e.g. committee meetings, memos, official verbal or written business communication)?	Likert, 1-3
Regarding work-related matters, how often do you communicate with people in the following organizations through informal channels (e.g. chance conversations, spontaneous meetings, personal notes, emails and phone calls, drinks after work)?	Likert, 1-3

Research question 3 was operationalized using to Sikinna Jinnah's three degrees of influence as seen in Table 5. Influence refers to "the mobilization of power or authority to realize outcomes" (Jinnah, 2014, p. 51). A mechanism of influence is capacity building which includes activities such as providing assistance in "shaping policies through, for example, workshops or providing formal or informal technical advice" (Jinnah, 2014, p. 52). Influence on a particular outcome can be categorized as none, weak, moderate, or strong "by examining the characteristics of the relevant impact" (Jinnah, 2014, p. 54).

Participants were asked to rate on a three-point Likert scale (never, occasionally, or regularly) how communications with each selected agency, enhanced their knowledge of

community resiliency, led them to make professional choices or decisions that they would not have otherwise made, and led them to rethink their approach to natural disaster preparedness. Each question corresponds to a different degree of influence exerted by the selected agency on the respondent.

Table 5: Operationalization of Research Question 3

Influence Strength	Definition	Survey Question	Scale
Weak	Information provision	How often has your communications with people from this organization, or documentation from it, enhanced your knowledge of community resiliency?	Likert, 1-3
Moderate	Behavior change	How often has communicating with people in the following organization led you to make professional choices or decisions that you would not have otherwise made?	Likert, 1-3
Strong	Fundamentally rethink approach	To what extent have your communications with people at this organization led you to rethink your approach to natural disaster preparedness?	Likert, 1-3

Network diagrams were then developed from these questions to illustrate the extent to which civil servants participating in the preparedness network of the Rio Grande Valley within the scope of this study communicate with staff in other agencies within and across jurisdictions (Temby et al., 2015). Formal and informal communication scores between agencies were calculated separately for each respondent and averaged across the agencies within a specific jurisdiction. The scores were standardized on a 0–1 scale, “indicating communicative intensity with the jurisdictions of the agencies that respondents reported communicating with” (Temby et al., 2015, p. 87). Therefore, each of the scores represent average scores across agencies of each of the five jurisdictional categories.

Finally, research question 4 was operationalized with questions shown on Table 6. Given the geopolitical characteristics of the Rio Grande Valley, we felt it was necessary to ask respondents about their experiences collaborating with neighboring Mexican counterparts.

Activities that foster knowledge transfer were identified by asking respondents to select from a range of options that describe the focus of their emergency management conversations with colleagues in other agencies. The options included preparedness plans, seminars and workshops, tabletop exercises, drills, full scale exercises, emergency management conferences, and hazard vulnerability assessment. These are all indicators of collaboration among emergency preparedness practitioners in the Rio Grande Valley.

Table 6: Operationalization of Research Question 4

Survey Question	Scale
How often do you communicate local planning and preparedness efforts with neighboring Mexican government counterparts?	Likert, 1-3
Which of the following information distribution channels does your organization utilize to disseminate disaster preparedness information to the Spanish-speaking population?	Multiple selection menu
Do you participate in the following local disaster preparedness activities?	Multiple selection menu
How often does federal agency guidance get implemented in local preparedness activities?	Likert, 1-3

Limitations

Limitations to the findings of this study are related to generalizability. We sampled from public servants working in preparedness-related activities in the Rio Grande Valley. Limitations to this sampling strategy was the possibility of not identifying all active participants in emergency management activities. There were some agencies where we were not able to locate email addresses to distribute the survey to. Additionally, participants who agreed to participate may not be representative of those who did not agree to participate (Reininger et al., 2013). Therefore, non-response bias is a limitation to account for.

Secondly, given the lack of empirical research on the institutional dimension of social capital within and between government agencies, exploratory and descriptive case study research

methods were utilized (Temby et al., 2015). We merely offer a snapshot if preparedness among public stakeholders. Therefore, findings from this study do not employ inferential statistics and overall, have limited generalizability beyond the study sample.

CHAPTER IV

RESULTS

The survey was sent out to a total of 569 email addresses of which 82 emails bounced. We received 63 responses of which 22 were incomplete and thus discarded. A total of 41 surveys were analyzed. Our response rate was 11%. The survey consisted of consent and IRB requirements, demographic variables, communication variables, and RGV-specific activity variables and comments. We also conducted 10 semistructured interviews with preparedness leaders across the Rio Grande Valley.

Data Analysis

Descriptive analysis of demographic variables (Table 7) revealed that 42% of respondents were employed within local agencies. The next largest representative group of our study were public servants who worked at the state level represented 27% of our sample. University institutions made up 15% of respondents. We received less than 10% responses respectively from civil servants who worked at federal agencies and non-governmental organizations. Most respondents identified working in local governmental organizations. The next large group of respondents came from state agencies. We received few responses from NGOs and Federal employees.

Figure 2 shows our respondents' years of experience in the field. About 29% of respondents identified having between 1-5 years of experience in the field and slightly over 40% of respondents identified having more than 10 years of working experience in the field.

Table 7. Completed Survey Responses

Institution Type	Frequency	Survey (percentage) (%)
Federal	4	9.8
State	11	26.8
Local	17	41.5
NGO/Nonprofit	3	7.3
University	6	14.6
Total	41	100.0

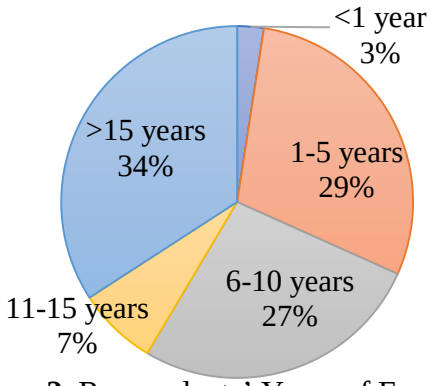

Figure 2. Respondents' Years of Experience

We received responses from participants working in a variety of roles varying from, planning, healthcare/social services, and public works. Figure 3 shows our respondents' primary roles within their agencies. Nearly two-fifths (39%) identified planning as their primary role. The next largest share (15%) noted their primary role was project management; 12% identified their primary role as first responders; and 10% said their primary role was in healthcare/social services and public works.

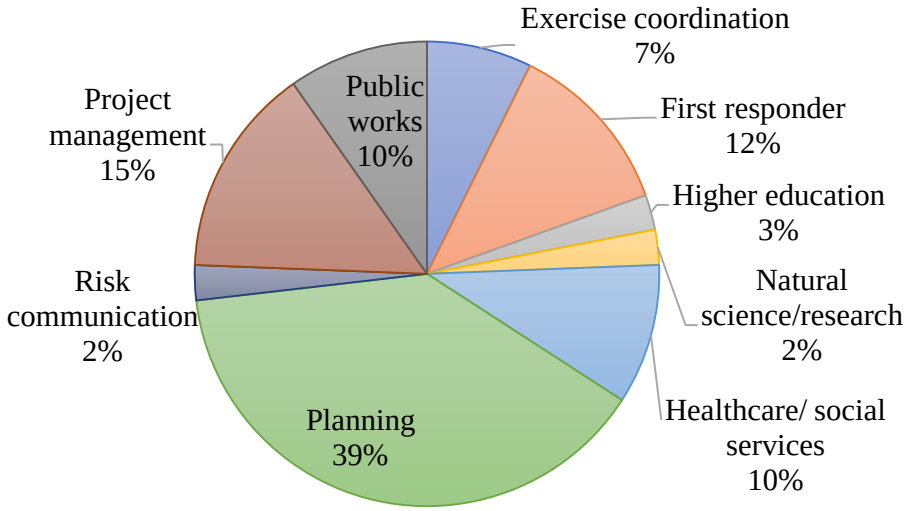

Figure 3. Respondents' Primary Role

Table 8 refers to respondent's self-identification of the corresponding emergency support function they support. Emergency Support Function annexes are enumerated protocols set forth by the National Response Framework which forms part of the National Strategy for Homeland Security. The Emergency Support Functions (ESFs) provide the structure for coordinating Federal interagency support for a Federal response to an incident. When asked about the emergency support function that they best identify with, about a quarter of respondents (24.4%) selected ESF #8 Public Health and Medical Services Annex. 22% were not sure and 19.5% selected ESF #3 Public Works and Engineering Annex.

Table 8. Respondents' Emergency Support Function

Emergency Support Annex	Frequency	Percentage (%)
ESF #1 – Transportation Annex	1	2.4
ESF #2 - Communications Annex	1	2.4
ESF #3 – Public Works and Engineering Annex	8	19.5
ESF #4 – Firefighting Annex	2	4.9
ESF #5 – Information and Planning Annex	5	12.2
ESF #6 – Mass Care, Emergency Assistance, Temporary Housing, and Human Services Annex	3	7.3
ESF #8 – Public Health and Medical Services Annex	10	24.4
ESF #9 – Search and Rescue Annex	1	2.4
ESF #11 – Agriculture and Natural Resources Annex	1	2.4
Not Sure	9	22.0
Total	41	100.0

Figure 4 illustrates a heat map depicting the general locations of employment by zip code of our respondents. Looking at our data spatially, we see that a majority of respondents came from the Rio Grande Valley with a few others scattered throughout the state. One response came from out of state – pertaining to the Gulf of Mexico Alliance located Mississippi. These few

respondents working outside the region mostly identified with state, federal, NGO, and university agencies that maintained communication with Rio Grande Valley counterparts.

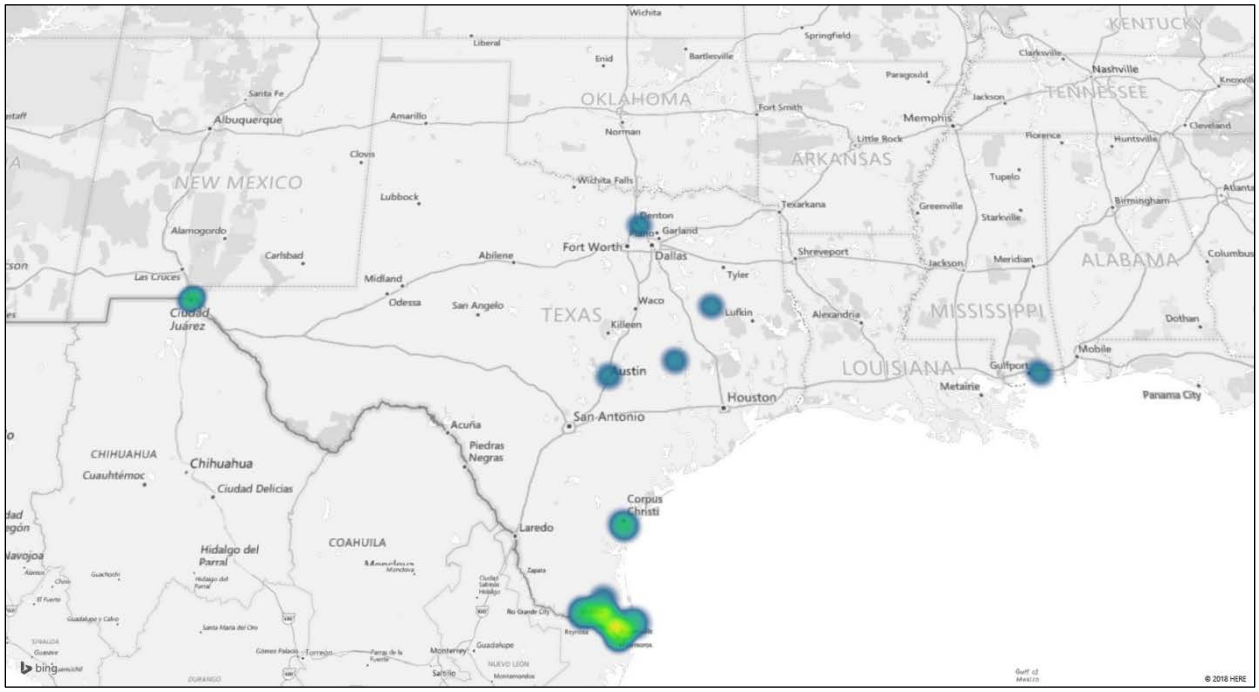

Figure 4. Heat Map of Survey Respondents

When taking a closer look at the zip codes corresponding to the responses received from the Rio Grande Valley, we see that participants indicated working in Cameron, Hidalgo and Willacy counties. The darker the shade of blue in figure 5, the higher the frequency of participants in a given zip code. From the figure, we can see that a majority of respondents indicated working in Cameron County. Few respondents indicated working in Willacy and Hidalgo counties. We did not receive any responses from participants working in Starr county.

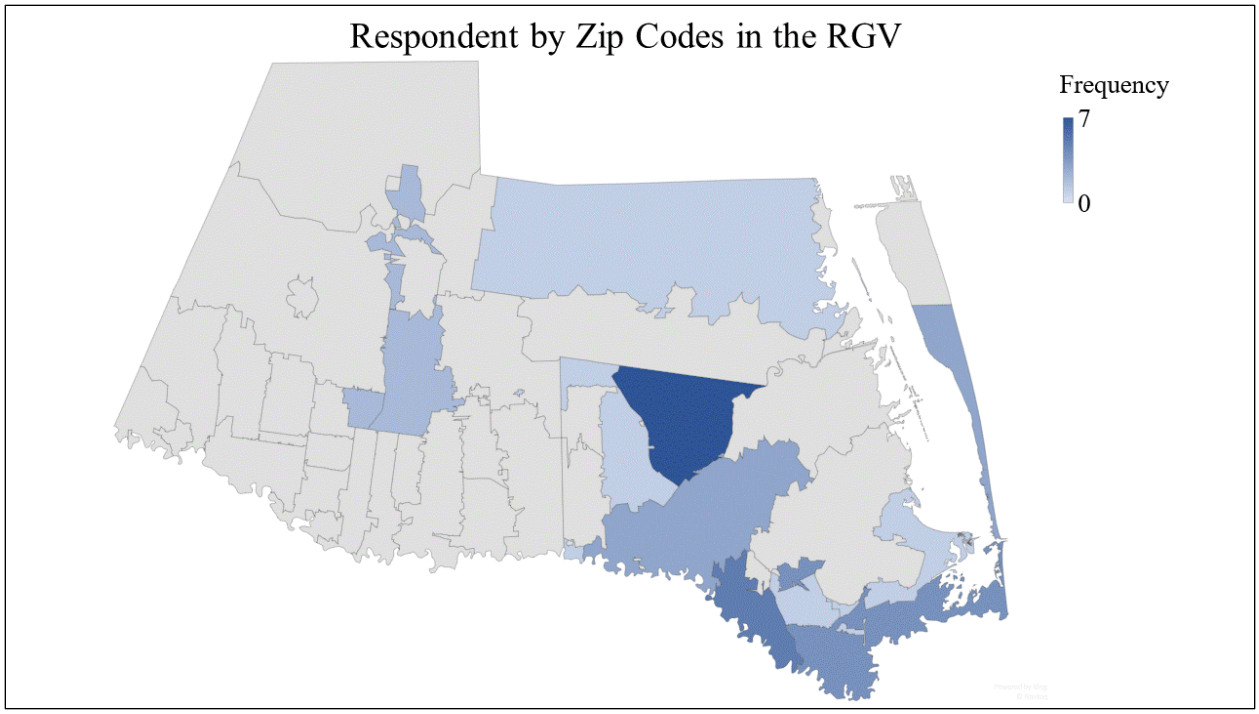

Figure 5. Respondent Zip Codes in the Rio Grande Valley

Communication Patterns Among RGV Practitioners

Figures 6 and 7 present the distribution of communicative intensity based on respondent's reported contact with other agencies. These network diagrams were modeled after the Formal and Informal Interjurisdictional Communicative Intensity figures from the article, *Interagency Trust and Communication in the Transboundary Governance of Pacific Salmon Fisheries* (Temby et al., 2015). The figures present the results of the analysis of the distribution of communicative intensity based on the cases that report contact with the target agency. All relationships depict a percent communicating (PC) measure, which represents the "percent of respondents from the source jurisdiction reporting to communicate with the target jurisdiction" (Temby et al., 2015, p. 88). The relative intensity of the corresponding relationship is reflected on the thickness of the arrows. Because a majority of respondents were from the state and local agencies, federal, university, and NGOs are included only as target agencies. The PC results indicate that local agencies maintain the most common points of contact with federal and state

agencies on disaster-related issues. State agencies indicated maintaining a consistent communication among local, federal, and NGO partners. University institutions had the least common points of contacts among all groups.

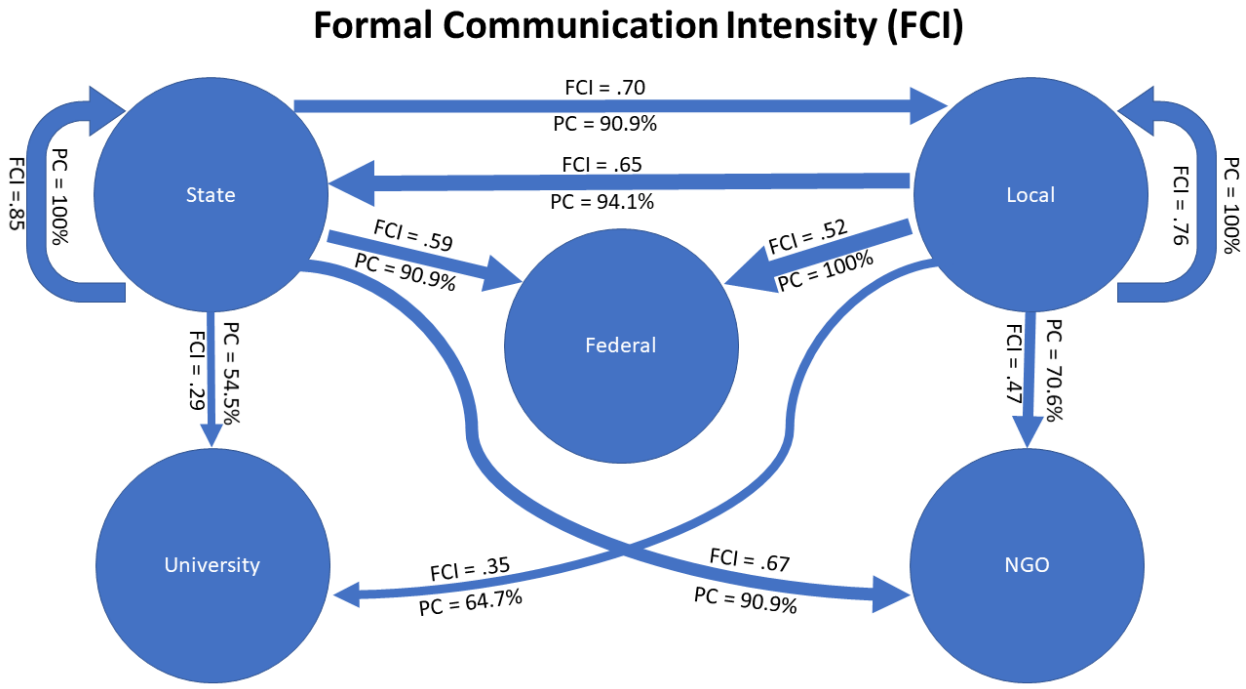

Figure 6. Formal Communication Intensity

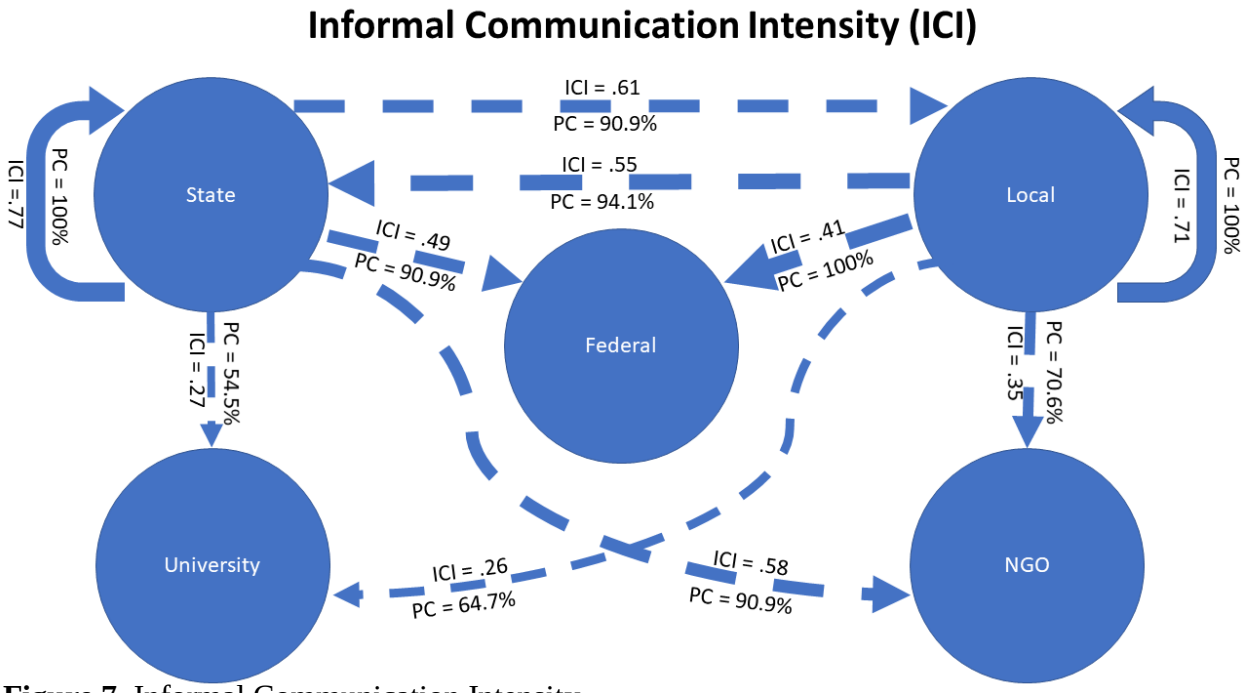

Figure 7. Informal Communication Intensity

When comparing the Formal Communication Intensity (FCI) ratio to the Informal Communication Intensity ratio (ICI) we see that Formal communication ratios are higher than informal communication ratios in all of the communication arrangements. Therefore, the reported weighted linkages of formal and informal communications demonstrate the prevalence of formal communication in the Rio Grande Valley emergency support network.

Influence Analysis

Communication, influence type, and frequency is displayed in Table 9. This table displays the top 15 agencies with the highest number of respondents who reported communicating with through the operationalization of Sikinna Jinnah's three degrees of influence (weak, moderate, and strong). All degrees of influence need to be considered against percent communicating when interpreting this table. O + R represent the averages of all "occasionally" and all "regularly" responses.

Table 9. Effects of Communication in the Rio Grande Valley Preparedness Network

			Weak Influence				Moderate Influence				Strong Influence			
Type	Target Org	PC	O + R		Regular		O + R		Regular		O + R		Regular	
Federal	CBP	0.51	0.90	(0.07)	0.38	(0.11)	0.63	(0.11)	0.16	(0.08)	0.81	(0.09)	0.10	(0.06)
	FEMA	0.56	0.91	(0.06)	0.57	(0.10)	0.58	(0.10)	0.14	(0.07)	1.00	(0.00)	0.61	(0.10)
	NWS	0.59	1.00	(0.00)	0.54	(0.10)	0.61	(0.10)	0.15	(0.07)	0.92	(0.06)	0.50	(0.10)
State	TDEM	0.76	0.90	(0.05)	0.71	(0.08)	0.43	(0.09)	0.11	(0.06)	1.00	(0.00)	0.61	(0.09)
	DSHS	0.54	1.00	(0.00)	0.68	(0.10)	0.42	(0.11)	0.11	(0.07)	0.82	(0.08)	0.55	(0.11)
	TGLO	0.49	0.85	(0.08)	0.20	(0.09)	0.73	(0.10)	0.18	(0.09)	0.80	(0.09)	0.15	(0.08)
Local	CC	0.73	0.90	(0.05)	0.57	(0.09)	0.53	(0.09)	0.13	(0.06)	0.93	(0.05)	0.40	(0.09)
	COB	0.66	0.74	(0.08)	0.37	(0.09)	0.49	(0.10)	0.12	(0.06)	0.81	(0.07)	0.26	(0.08)
	COM	0.61	0.92	(0.05)	0.48	(0.10)	0.59	(0.10)	0.15	(0.07)	0.88	(0.06)	0.20	(0.08)
	HC	0.54	0.91	(0.06)	0.68	(0.10)	0.42	(0.11)	0.11	(0.07)	0.95	(0.04)	0.36	(0.10)
	LRGVDC	0.54	0.95	(0.04)	0.64	(0.10)	0.61	(0.10)	0.15	(0.08)	0.86	(0.07)	0.41	(0.10)
NGOs	ARC	0.49	1.00	(0.00)	0.65	(0.11)	0.40	(0.11)	0.10	(0.07)	0.65	(0.11)	0.30	(0.10)
	SA	0.34	0.93	(0.07)	0.36	(0.13)	0.38	(0.13)	0.10	(0.08)	0.64	(0.13)	0.36	(0.13)
University	UTRGV	0.54	0.77	(0.09)	0.32	(0.10)	0.80	(0.18)	0.20	(0.18)	0.80	(0.18)	0.60	(0.22)
	TSG	0.12	1.00	(0.00)	0.60	(0.22)	0.61	(0.10)	0.15	(0.08)	0.64	(0.10)	0.09	(0.06)

Note: Standard error in parenthesis.

The federal agency that was selected the most in terms of communication in the professional role was the National Weather Service. Of the respondents who claim some contact with the agency, 100 percent indicated communication with the National Weather Service occasionally or regularly enhanced their knowledge of community resiliency (weak influence), and 92 percent indicated that communications with the National Weather Service occasionally or regularly led them to rethink their approach to natural disaster preparedness (strong influence). One respondent mentioned that the "National Weather Service [is influential in their role] for planning weather-related disasters."

The agency that was selected the most in terms of communication overall in the professional role was the Texas Department of Public Safety / Texas Division of Emergency Management (TDEM). Of the respondents who claim some contact with the agency, 90 percent indicated communication with TDEM occasionally or regularly enhanced their knowledge of community resiliency (weak influence), and 100 percent indicated that communications with TDEM occasionally or regularly led them to rethink their approach to natural disaster preparedness (strong influence).This agency plays a crucial role in applying federal guidance and implementing it across the state. In times of emergencies, the Texas Department of Public Safety / Texas Division of Emergency Management set up the State Operations Center and maintain communication and facilitate resources with disaster-affected jurisdictions. TDEM is also consistently one of the most influential organizations in the Rio Grande Valley Preparedness network.

This trend is backed up by the qualitative data we collected. As some local community members responded, TDEM showed up constantly in qualitative data.

- *"FEMA and TDEM. Once a disaster is declared, both agencies provide assistance, guidance and oversight over the various assistance programs they offer."* – Local agency
- *"TDEM Texas has been our partner and if questions are asked they will help us obtain the answers"* – Local agency
- *"FEMA, TXDOT, TDPS/TDEM, they are very proactive in training and helping our community get back on its feet in case there is any damage(s) from any natural disasters."* – Local agency

Preparedness Activities

Figure 8 shows the rate of implementation of federal guidance in local planning and preparedness activities by jurisdictional group. Federal agencies, not surprisingly, frequently implement federal guidance at a much higher rate than the other groups. Local agencies equally stated that they frequently and occasionally implement federal guidelines in the planning and preparedness activities. NGOs frequently implement federal guidance at a much higher rate than local, state, and university organizations. Eighty percent of university participants indicated that they occasionally implement federal agency guidance in preparedness activities.

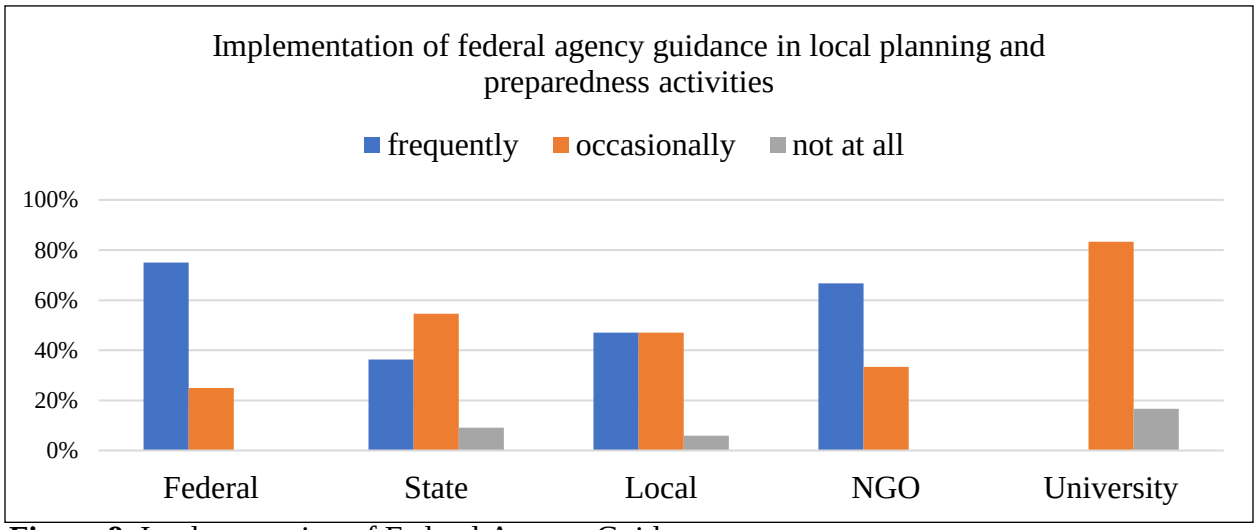

Figure 8. Implementation of Federal Agency Guidance

Disaster planning and preparedness activities that agencies listed participating in are shown in Figure 9. Activities include participation in regional planning, seminar or workshops, tabletop exercises, drills, full-scale exercises, attendance to emergency preparedness conferences, FEMA Emergency Management Institute (EMI) trainings, NIMS trainings, and development of regional hazard vulnerability analysis (HVA). More than 80 percent of participants from state, local, and nonprofit organizations stated they participate in regional planning, seminar or workshops, tabletop exercises, and drills. The planning and preparedness activity with the least activity is the development of regional hazard vulnerability analysis.

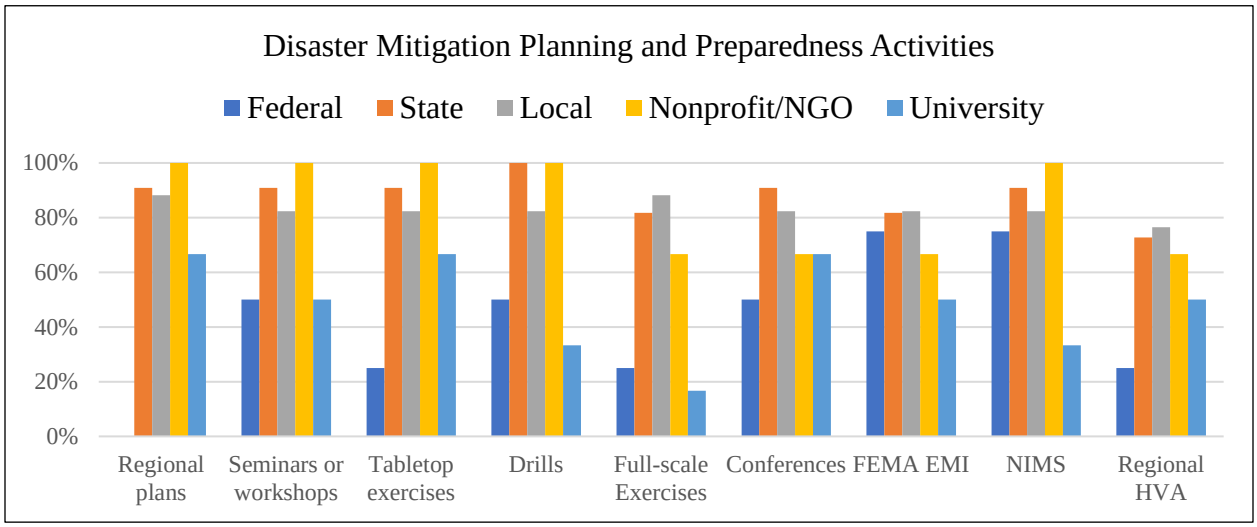

Figure 9. Planning and Preparedness Activities

Figure 10 shows the distribution channels participants noted their agency utilizes in sharing information to the Spanish-speaking population in the Rio Grande Valley. Public events and pamphlets are the top distribution mediums utilized in total. Out of our sample, 10 percent of participants stated that none of the listed distribution mediums were utilized within their scope of work. The least utilized distribution channel was sharing information through churches.

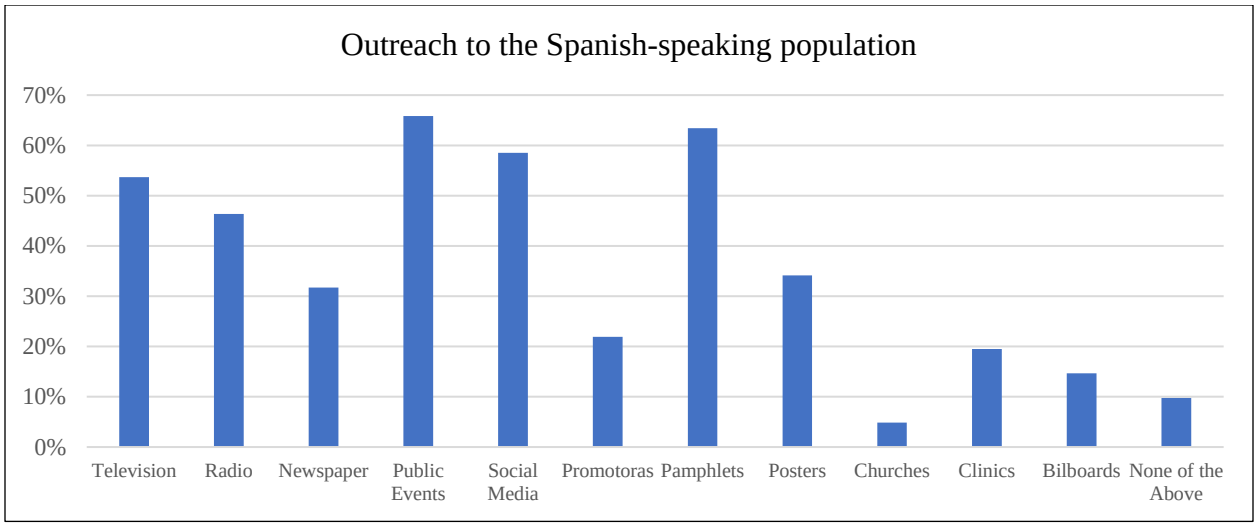

Figure 10. Information Distribution Channels to the Spanish-Speaking Population

Outreach activities through public events and promotoras were expanded on with the qualitative data we collected as shown on this slide. A local agency mentioned the following:

"We do community outreach before hurricane season. We have [public] sessions every week in preparations for hurricane season throughout the county. We inform in both English and Spanish about what [residents] need to do. We also work with precinct outreach coordinators and nonprofit organizations to get the message out the colonias and to the promotoras in the colonias." – Local agency

Colonias are low-income unincorporated housing-areas located along the Mexico–United States border region. This next quote explains why promotoras are so important in socially vulnerable communities such as colonias.

"It's not that easy to [introduce social programs] into the colonias. We hire promotoras through community groups, and they are our eyes and ears, they go out into the communities, they go door to door, they visit families, they provide pamphlet, brochures about programs and services, etc. They know the community, they are trusted by the communities because most of

them live there, and they give us [state agencies] feedback on what they see in the community. They are the link to the state agencies." – State agency

Communication with Mexican Counterparts

Figure 11 present the results of the analysis of the polled agencies' self-assessment in communication with Mexican counterparts. Less than 10 percent of respondent pool noted frequently communicating with Mexican counterparts.

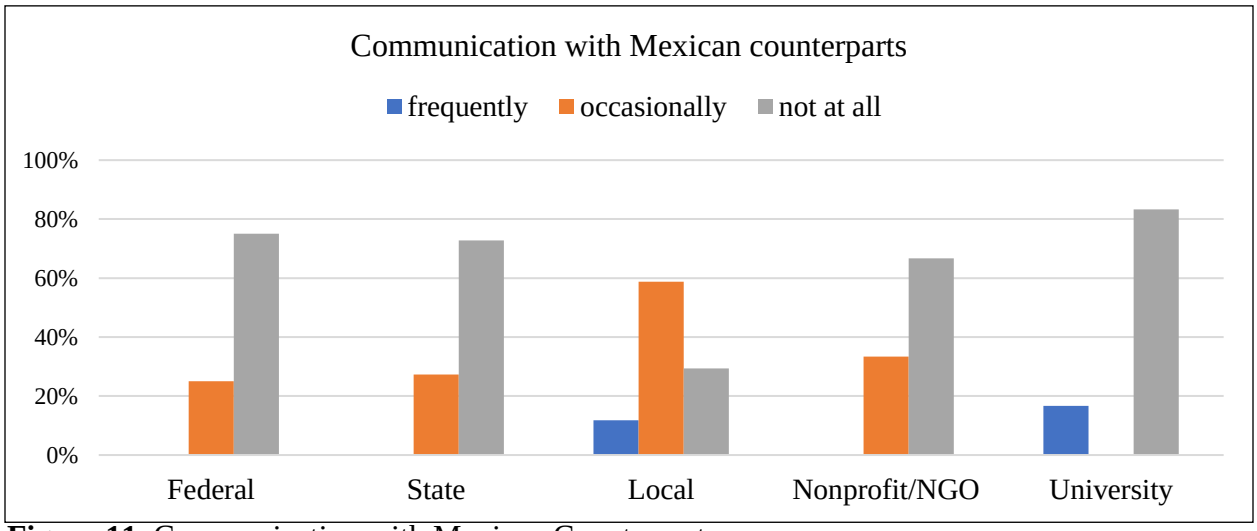

Figure 11. Communication with Mexican Counterparts

Open-ended responses suggest that agency interaction with Mexican counterparts are not as fruitful as it was in prior years due to the increased violence and travel warning set forth by the U.S. State Department deterring U.S.-based organizations to crossing over to Tamaulipas to support a community-wide emergency support function as depicted by qualitative data. Participants also noted that some Mexican officials do come over to the U.S. side and participate in binational conferences and regional meetings on the U.S. side of the border and collaboration with the State Department has facilitated a lot of their communications. A common sentiment expressed by interviewees was the desire to further expand those ties given the intertwined nature of sister border cities observed through daily commuters and trade.

"I have done a couple of workshops and presented about mental health services that we do in the state of Texas over in Mexico. We continued to build partnerships and attended each other's meetings. Those are the kinds of collaborations we need to do with our partners on both sides of the border. Because of violence in Mexico, state agencies have prohibited our employees from crossing over. Such political challenges could affect binational partnership process, but I still think, personally, that we can continue." – State agency

"It slowed down when unfortunately, the cartel wars slid from Juarez out towards Laredo and moved south… around 2009, and once those travel advisories went into effect in Tamaulipas we really couldn't go [across the border] without the escort of the State Department… There used to be conferences over there... Those don't happen anymore. So, the relationships aren't dead, they've slowed down because of our ability for us to go in and meet with them." – Federal agency

"I'm part of the Border 2020 initiative which is a collaboration between the US and Mexico when it comes to hazardous materials, waste, and health. We collaborate in how we get the message between our countries should something be impacted here; such as wind blowing the plume to Mexico or vice versa. I haven't had the opportunity to train with them but we've dialogued." – Local agency

These assertions contrast the relationship and collaboration between agencies within the Rio Grande Valley. One quote sums up the consensus among interviewees about the collaborative preparedness effort in the south Texas region:

"Other than a lack of funding and resources. The spirit of cooperation in the valley is just tremendous. There is far greater cooperation in the valley than other parts of the state. At other places there is a lot of territorialism. Down here I see very little of that." – Local agency

CHAPTER V

CONCLUSION

Exploration of social capital through the scope of interorganizational disaster preparedness in a fast-growing region characterized by high social vulnerability to environmental hazards was the driving force behind this study. As more people move to the Rio Grande Valley, the costlier it will be to protect property and life due to increased infrastructure. Formal and informal interactions and interorganizational coordination have been underscored in previous research as making communities resilient to natural disasters in bridging organizational partners and coordinating complex decision-making across organizational and jurisdictional boundaries.

In this study, we observed how civil servants in the Rio Grande Valley across disciplines and hierarchies participate in emergency management planning and response by sharing information and communicating at different digrees of frequency amongst their peers. We found that state and local agencies make up the majority of the Rio Grande Valley preparedness network. Federal agencies play a crucial and influential role in disseminating guidance, as in the case of the National Weather Service who is instrumental in providing local and state organizations with weather information to make informed decisions about preparedness activities. Our analysis also reveals the influential role of state agencies, such as the Texas Department of Emergency Management on preparedness and planning for local decision makers. With their guidance, local officials coordinate and prepare regional plans and full-scale exercises. We learned that formal and informal connectivity among network partners are

comparable, with slightly higher formal communication among all participants. The patterns of formal and informal communication observed from our study largely ocurred within expected jurisdictional boundaries. We also determined that there is drastically lower communication with university partners. University partnerships, such as that of Texas Sea Grant, can be critical to network, as one participant indicated, "because of [their] emphasis on using peer-reviewed science to guide decision making."

Lastly, we found that self-assessment of collaboration among Rio Grande Valley disaster preparedness practitioners is high, however the same is not reflected with neighboring Mexican counterparts. Qualitative data collected from interviews of U.S.-based practitioners reveal that interaction with Mexican counterparts is not as fruitful as it was in prior years due to the increased violence and travel warnings set forth by the U.S. State Department. Our findings also revealed the intrinsic desire of several emergency management practitioners to explore opportunities for relationship building with neighboring Mexican counterparts. Even though the responses are one-sided, the information gained is useful for interpreting the binational collaboration in emergency support functions in the Rio Grande Valley.

We have provided an account of the policy system as it exists in practice expressed through official documents with the consideration of limitations associated with studies relying heavily on survey instruments. Despite the limitations on generalizability beyond the study sample, our findings are a necessary starting point for subsequent research on the region given that the local disaster preparedness network in the Rio Grande Valley has never been studied in this manner before.

Previous research recognize the relationship between informal communication within a network and trust among network members. Trust is crucial within networks as it leads to cross-

boundary partnerships and “stimulates learning and the exchange of information and knowledge among stakeholders” (Edelenbos & van Meerkerk, 2015, p. 27). Boundary spanners are skilled networkers who link different people and processes at both sides of the boundary, building trustful relationships, and positively affecting the performance of governance networks. Boundary spanning behavior, including boundary spanners, and trust give room to stimulating learning, the exchange of information, and innovation. Both these factors are crucial for developing connective capacity and further studies within this scope could be done.

Additional studies can apply the advocacy coalition framework (ACF) to analyze and understand policy change processes in complex social structures such as that of the local preparedness network in the Rio Grande Valley (Sabatier, 2007). Sabatier & Jenkins-Smith define policy-oriented learning as the “relatively enduring alterations of thought or behavioral intentions that result from experience and/or new information and that are concerned with the attainment or revision of policy objectives” (Sabatier & Jenkins-Smith, 1999, p. 123). Policy-oriented learning “may result from formalized discussions between individuals and organizations that hold competing views on the causal understanding and preferred policy alternatives of a policy problem” (Albright, 2011, p. 489). ACF analysis of contrasting beliefs can help explain policy change and learning of policy networks over a period of a decade or longer (Sabatier, 2007).

Gaining a deeper understanding of the emergency management framework in an economically disadvantaged and fluid border community exemplifies the importance of collaborative networks and a need to further explore ways to navigate the current policy structures in a transnational setting with distinct organizational structures across geopolitical divisions.

REFERENCES

Agranoff, R., & McGuire, M. (2001). Big Questions in Public Network Management Research. Journal of Public Administration Research and Theory, 11(3), 295-326. doi:10.1093/oxfordjournals.jpart.a003504

Albright, E. A. (2011). Policy Change and Learning in Response to Extreme Flood Events in Hungary: An Advocacy Coalition Approach. Policy Studies Journal, 39(3), 485–511. https://doi.org/10.1111/j.1541-0072.2011.00418.x

Arnold, D. T. (2012). The Theory of Social Disruption. Bloomington, IN: AuthorHouse.

Birkland, T., & Waterman, S. (2008). Is Federalism the Reason for Policy Failure in Hurricane Katrina? Publius, 38(4), 692–714.

Busch, N., & Givens, A. (2013). Achieving Resilience in Disaster Management: The Role of Public-Private Partnerships. *Journal of Strategic Security*, *6*(2), 1-19. doi:10.5038/1944-0472.6.2.1

Cameron County. (2015). Cameron County Hazard Mitigation Plan. Retrieved from http://www.co.cameron.tx.us/document_center/Approved_Cameron_County_HMAP_Ready_for_Web_Page.pdf

Christophe, A. S. (2009). Managing natural disasters: performance of two national disaster management agencies and one major non-profit organization (Doctoral dissertation).

Cioffi-Revilla, C. (2014). Introduction to Computational Social Science: Principles and Applications. London: Springer-Verlag. Retrieved from www.springer.com/us/book/9781447156611

Comfort, L., Waugh, W., & Cigler, B. (2012). Emergency Management Research and Practice in Public Administration: Emergence, Evolution, Expansion, and Future Directions. Public Administration Review, 72(4), 539–547. https://doi.org/10.1111/j.1540-6210.2012.02549.x

Cutter, S. L., & Finch, C. (2008). Temporal and Spatial Changes in Social Vulnerability to Natural Hazards. Proceedings of the National Academy of Sciences of the United States of America, 105(7), 2301–2306.

Department of Homeland Security. (2017). Implementation Guidance and Reporting. Retrieved from https://www.fema.gov/implementation-guidance-and-reporting

Edelenbos & van Meerkerk, 2015, “Connective capacity in water governance practices: The meaning of trust and boundary spanning for integrated performance,” Current Opinion in Environmental Sustainability 12: 25-29

Farazmand, A. (2014). Crisis and emergency management: theory and practice. Retrieved from http://www.crcnetbase.com/isbn/9781420013672

Federal Emergency Management Agency. (2018). 2017 Hurricane Season FEMA After-Action Report (After-Action Report) (p. 65). Retrieved from https://www.fema.gov/media-library/assets/documents/167249

FEMA. (2017). FEMA - Emergency Management Institute (EMI) Course | IS-393.B: Introduction to Hazard Mitigation. Retrieved from https://training.fema.gov/is/courseoverview.aspx?code=IS-393.b

Haddow, G. D., Bullock, J. A., & Coppola, D. P. (2017). *Introduction to emergency management*. Cambridge, MA: Butterworth-Heinemann.

Harris, J. K., & Clements, B. (2007). Using Social Network Analysis to Understand Missouri's System of Public Health Emergency Planners. Public Health Reports, 122(4), 488-498.

Hidalgo County. (2016). Hidalgo County Resolution. Retrieved from http://agenda.hidalgocounty.us/docs/2016/CC/20160405_2705/53799_3-22-16%20RESOLUTION%20to%20adopt%20Hazard%20Mitigation%20Action%20Plan%202016.pdf

Isett, K. R., Mergel, I. A., LeRoux, K., Mischen, P. A., & Rethemeyer, R. K. (2010). Networks in Public Administration Scholarship: Understanding Where We Are and Where We Need to Go. Journal of Public Administration Research and Theory, 21(Supplement 1), i157-i173. doi:10.1093/jopart/muq061

Jensen, J., & Waugh, W. L. (2014). The United States' Experience with the Incident Command System: What We Think We Know and What We Need to Know More About. *Journal of Contingencies and Crisis Management*, *22*(1), 5-17. doi:10.1111/1468-5973.12034

Jinnah, S. (2014). Post-Treaty Politics: Secretariat Influence in Global Environmental Governance. The MIT Press.

Klijn, E., Edelenbos, J., & Steijn, B. (2010). Trust in Governance Networks: Its Impacts on Outcomes. Administration & Society, 42(2), 193–221. https://doi.org/10.1177/0095399710362716

Kovacs, P. & H. Kunreuther, 2001, “Managing Catastrophic Risk: Lessons from Canada” Paper Presented at *the ICLR/IBC Earthquake Conference.* Simon Fraser University, Vancouver, March 23, 2001.

Kunkle, A. (2016). Valley Cities team up for FEMA’s Hazard Mitigation Action Plan. Retrieved from Port Isabel Press. Retrieved from http://portisabelsouthpadre.com/2016/03/11/valley-cities-team-up-for-femas-hazard-mitigation-action-plan/

Kunreuther, H. (2008). Reducing Losses from Catastrophic Risks through Long-Term Insurance and Mitigation. Social Research, 75(3), 905–930.

Manjikian, M. (2012). Apocalypse and Post-politics: The Romance of the End. Lexington Books.

Madry, S. (2015). Disaster Management and the Emergency Management Culture. In S. Madry (Ed.), Space Systems for Disaster Warning, Response, and Recovery (pp. 5–16). New York, NY: Springer New York. https://doi.org/10.1007/978-1-4939-1513-2_2

McClain, M. (2016). Hazard mitigation plan open for comment. Retrieved from Port Isabel Press. Retrieved from http://portisabelsouthpadre.com/2016/09/23/hazard-mitigation-plan-open-for-comment/

McEntire, D. A., & Dawson, G. (2007). The intergovernmental context. In W. L. Waugh & K. J. Tierney (Eds.), Emergency management: Principles and practice for local government (2nd ed., pp. 57-70). Washington, DC: International City/County Management Association.

McEntire, D. (2007). Disciplines, disasters, and emergency management: The convergence and divergence of concepts, issues and trends from research literature. Springfield, IL: Charles C. Thomas, pp. xxv, 334.

Mckenzie, Pinger, R. R., & Seabert, D. (2016). An Introduction to Community & Public Health. Jones & Bartlett Learning.

McLaughlin, C., & Krantzberg, G. (2012). An appraisal of management pathologies in the Great Lakes. The Science of the Total Environment, 416, 40–47. https://doi.org/10.1016/j.scitotenv.2011.12.015

Mycoff, J. (2007). Congress and Katrina: A Failure of Oversight. State and Local Government Review, 39(1), 16–30. https://doi.org/10.1177/0160323X0703900103

Noy, I. (2009). The macroeconomic consequences of disasters. Journal of Development Economics, 88(2), 221–231. https://doi.org/10.1016/j.jdeveco.2008.02.005

Putnam, R. (1995). Bowling Alone: America’s Declining Social Capital. Journal of Democracy, 6(1), 65–78. https://doi.org/10.1353/jod.1995.0002

Rio Grande Institute. (2008). Hazard Mitigation Action Plan for the Rio Grande Border. http://www.lrgvdc.org/downloads/FINAL%20Cover%20the%20Border%20RGV%20FINAL%20PLAN_10.27.08.pdf

Sabatier, P.A., & Jenkins-Smith, H. (1999). The advocacy coalition framework: An assessment. In P. Sabatier (ed.), Theories of the Policy Process. pp. 117-166. Boulder, CO: Westview Press.

Sabatier, P. A. (2007). *Theories of policy process*. Boulder, Colorado: Westview Press.

Smolka, A. (2006). Natural catastrophes: causes, trends and risk management. The challenge of submarine mass movements - an insurance perspective. Norsk Geologisk Tidsskrift-Norwegian Journal of Geology, 86(3), 363–372. Retrieved from http://search.proquest.com/docview/21110174/

Stern, M., & Baird, T. (2015). Trust ecology and the resilience of natural resource management institutions. Ecology and Society, 20(2). https://doi.org/10.5751/ES-07248-200214

Temby, O., Rastogi, A., Sandall, J., Cooksey, R., & Hickey, G. M. (2015). Interagency Trust and Communication in the Transboundary Governance of Pacific Salmon Fisheries. Review of Policy Research, 32(1), 79–99.

Texas Department of Public Safety. (2013). State of Texas Hazard Mitigation Plan. Retrieved from https://www.dps.texas.gov/dem/Mitigation/txHazMitPlan.pdf

Texas Department of Transportation. (2017). Economically Disadvantaged County Program Publications. Retrieved from http://www.txdot.gov/government/programs/disadvantaged.html

Texas Government Code. (2013). CHAPTER 418. EMERGENCY MANAGEMENT. Retrieved from http://www.statutes.legis.state.tx.us/Docs/GV/htm/GV.418.htm

Tomaszewski, B. (2014). *Geographic Information Systems (GIS) for Disaster Management.* Boca Raton: CRC Press.

Turner, B. S. (2006). The Cambridge dictionary of sociology. New York, US: Cambridge University Press.

UNESCO. (2016). International Day for Disaster Reduction 2016 | United Nations Educational, Scientific and Cultural Organization. Retrieved from http://www.unesco.org/new/en/unesco/events/prizes-and-celebrations/celebrations/international-days/international-day-for-disaster-reduction-2016/

United States Census Bureau. (2016). QuickFacts- Cameron County, Texas & Hidalgo County. Retrieved from http://www.census.gov/quickfacts/table/PST045215/48061

US Census Bureau. (2016). Population in the U.S. Retrieved from https://www.google.com/publicdata/explore?ds=kf7tgg1uo9ude_&met_y=population&idim=county:48061:48215&hl=en&dl=en

Watkins, S. (2000). Developing Statewide Emergency and Disaster Preparedness Expertise. Journal of the American Institute for Conservation, 39(1), 165–172. https://doi.org/10.1179/019713600806113266

Waugh, W. L. (2007). Public Administration, Emergency Management, and Disaster Policy. In D. A. McEntire (Ed.), Disciplines, Disasters and Emergency Management: The Convergence and Divergence of Concepts, Issues and Trends from the Research Literature (pp. 161–169). Springfield, IL: Charles C Thomas Publisher.

Wharton Risk Center (2008). *Managing Large Scale Risks in a New Era of Catastrophes: Insuring, Mitigating, and Financing Recovery from Natural Disasters in the United States*. Philadelphia: University of Pennsylvania, Wharton School.

APPENDIX

Survey Draft/Codebook Local Disaster Coordination in RGV Project	
Demographic Variables	
1.1 What organization do you work for? <u>Federal and Inter-state</u> 1. CBP – Customs and Border Patrol (DHS agency) 2. EPA – Environmental Protection Agency 3. FEMA – Federal Emergency Management Agency (DHS agency) 4. NWS – National Weather Service (NOAA agency) 5. NOAA – NOAA (other than NWS and OCM) 6. OCM - National Hurricane Center (NOAA agency) 7. USACE – US Army Corps of Engineers <u>Texas</u> 8. TAHC - Texas Animal Health Commission 9. DADS – Texas Department of Aging and Disability Services 10. TDEM - Texas Department of Public Safety / Texas Division of Emergency Management 11. DSHS - Texas Department of State Health Services 12. TXDOT - Texas Department of Transportation 13. TGLO - Texas General Land Office <u>Local Organizations</u> 14. CC - Cameron County 15. COB – City of Brownsville 16. COH – City of Harlingen 17. SPI – City of South Padre Island 18. COM – City of McAllen 19. COW – City of Weslaco 20. CBRAC – Coastal Bend Regional Advisory Council 21. HC – Hidalgo County 22. LRGVDC – Lower Rio Grande Valley Development Council 23. POB – Port of Brownsville / Brownsville Navigation District 24. WC – Willacy County <u>NGOs</u> 25. ARC – American Red Cross	Dichotomous (1=Y, 2=N for all agencies)

26. GOMA – Gulf of Mexico Alliance 27. RGVFB – Rio Grande Valley Food Bank 28. SA – The Salvation Army <u>University</u> 29. TSG – Texas Sea Grant 30. UTRGV - University of Texas Rio Grande Valley Other 31. OR – Other	
1.1.1 If 1.1 What organization do you work for? = Other organization	Text box
1.2 How long have you been working in this organization? YRSEMPL	Categorical /scale 1-5 1= <1 year 2= 1-5 years 3= 6-10 years 4= 11-15 years 5= >15yrs
1.3 Please indicate which category best describes your current role? ROLE	ROLE Categorical 1-7 1= Planning 2= Risk communication 3= First responder 4= Higher education 5= Natural science/research 6= social science/research 7= Exercise coordination 8= Other
1.4 How long have you held your current position? YRSROLE	Categorical /scale 1-5 1= <1 year 2= 1-5 years 3= 6-10 years 4= 11-15 years 5= >15yrs
1.5 Which of the following activities do you do? ACTIVITIES	Categorical 1-10 1= Coordinate meetings 2= Develop exercise trainings 3= Develop emergency/disaster plans 4= Develop local emergency management policy 5= Engage with the general public 6= Engage with private stakeholders 7= Engage with public stakeholders

	8= Procurement/purchasing 9= Financial management
1.6 What is the area code of your place of work?	Text box

1.7 What Emergency Support Function is your work related to? (Select as many as apply) ESF	ESF Categorical 1-14 1= ESF #1 – Transportation Annex Transportation provides support by assisting local, state, tribal, territorial, insular area, and Federal governmental entities, voluntary organizations, nongovernmental organizations, and the private sector in the management of transportation systems and infrastructure during domestic threats or in response to actual or potential incidents. 2= ESF #2 - Communications Annex Communications supports the restoration of communications infrastructure, coordinates communications support to response efforts, facilitates the delivery of information to emergency management decision makers, and assists in the stabilization and reestablishment of systems and applications during incidents. 3= ESF #3 – Public Works And Engineering Annex Public Works and Engineering coordinates and organizes the resources of the Federal Government to facilitate the delivery of multiple core capabilities. 4= ESF #4 – Firefighting Annex Firefighting provides Federal support for the detection and suppression of wildland, rural, and urban fires resulting from, or occurring coincidentally with, an all-hazard incident requiring a coordinated national response for assistance.

	5= ESF #5 – Information And Planning Annex Information and Planning collects, analyzes, processes, and disseminates information about a potential or actual incident, and conducts deliberate and crisis action planning activities to facilitate the overall activities in providing assistance to the whole community. 6= ESF #6 – Mass Care, Emergency Assistance, Temporary Housing, and Human Services Annex Mass Care, Emergency Assistance, Temporary Housing, and Human Services coordinates and provides life-sustaining resources, essential services, and statutory programs when the needs of disaster survivors exceed local, state, tribal, territorial, and insular area government capabilities. 7= ESF #7 – Logistics Annex Logistics integrates whole community logistics incident planning and support for timely and efficient delivery of supplies, equipment, services, and facilities. It also facilitates comprehensive logistics planning, technical assistance, training, education, exercise, incident response, and sustainment that leverage the capability and resources of Federal logistics partners, public and private stakeholders, and nongovernmental organizations (NGOs) in support of both responders and disaster survivors. 8= ESF #8 – Public Health and Medical Services Annex Public Health and Medical Services provides the mechanism for Federal assistance to supplement local, state, tribal, territorial, and insular area resources in response to a disaster, emergency, or incident that may lead to a public

	health, medical, behavioral, or human service emergency, including those that have international implications. 9= ESF #9 – Search and Rescue Annex Search and Rescue (SAR) deploys Federal SAR resources to provide lifesaving assistance to local, state, tribal, territorial, and insular area authorities, including local SAR Coordinators and Mission Coordinators, when there is an actual or anticipated request for Federal SAR assistance. 10= ESF #10 – Oil and Hazardous Materials Response Annex Oil and Hazardous Materials Response provides Federal support in response to an actual or potential discharge and/or release of oil or hazardous materials when activated. 11= ESF #11 – Agriculture and Natural Resources Annex Agriculture and Natural Resources organizes and coordinates Federal support for the protection of the Nation's agricultural and natural and cultural resources during national emergencies. ESF #11 works during actual and potential incidents to provide nutrition assistance; respond to animal and agricultural health issues; provide technical expertise, coordination and support of animal and agricultural emergency management; ensure the safety and defense of the Nation's supply of meat, poultry, and processed egg products; and ensure the protection of natural and cultural resources and historic properties. 12= ESF #12 – Energy Annex Energy provides support to the Department of Homeland Security (DHS) by assisting local, state, tribal, territorial, and

	Federal government entities, nongovernmental organizations (NGO), and the private sector by coordinating government capabilities, services, technical assistance, and engineering expertise during disasters and incidents that require a coordinated Federal response. The term “energy” includes producing, storing, refining, transporting, generating, transmitting, conserving, building, distributing, maintaining, and controlling energy systems and system components. 13= ESF #13 – Public Safety and Security Annex Provides Federal public safety and security assistance to local, state, tribal, territorial, and Federal organizations overwhelmed by the results of an actual or anticipated natural/manmade disaster or an act of terrorism. 14= ESF #15 – External Affairs Annex External Affairs provides accurate, coordinated, timely, and accessible information to affected audiences, including governments, media, the private sector, and the local populace, including children; those with disabilities and others with access and functional needs,; and individuals with limited English proficiency. 15 = Not Sure

Communication Variables	Measures
2.1 Select all the following municipal, county, and state agencies you communicate with in your professional role - even if you only communicate with them occasionally	Dichotomous 1=Y/2=N for 29 agencies NB: filter variable, only those agencies that the respondent communicates with are

Federal 1. CBPa 2. EPAa 3. FEMAa 4. NWSa 5. NOAAa 6. OCMa 7. USACEa Texas 8. TAHCa 9. DADSa 10. TDEMa 11. DSHSa 12. TXDOTa 13. TGLOa Local Organizations 14. CCa 15. COBa 16. COHa 17. SPIa 18. COMa 19. COWa 20. CBRACa 21. HCa 22. LRGVDCa 23. POBa 24. WCa NGOs 25. ARCa 26. GOMAa 27. RGVFBa 28. SAa University 29. TSGa 30. UTRGVa	represented in communication and trust-related questions Help: Please include communication through both formal and informal channels. (e.g. formal channels: committee meetings, memos, official verbal or written business communication) (e.g. Informal channels: chance conversations, spontaneous meetings, personal notes, emails and phone calls, drinks after work).
2.2 Regarding work-related matters, how often do you communicate with people in the following organizations through formal channels (e.g. committee meetings, memos, official verbal or written business communication)?	3-point scale: 1=never 2=occasionally 3=regularly

(independent variable, formal communication) <u>Federal</u> 1. CBPb 2. EPAb 3. FEMAb 4. NWSb 5. NOAAb 6. OCMb 7. USACEb <u>Texas</u> 8. TAHCb 9. DADSb 10. TDEMb 11. DSHSb 12. TXDOTb 13. TGLOb <u>Local Organizations</u> 14. CCb 15. COBb 16. COHb 17. SPIb 18. COMb 19. COWb 20. CBRACb 21. HCb 22. LRGVDCb 23. POBb 24. WCb <u>NGOs</u> 25. ARCb 26. GOMAb 27. RGVFBb 28. SAb <u>University</u> 29. TSGb 30. UTRGVb	
2.3 Regarding work-related matters, how often do you communicate with people in the	3-point scale: 1=never

following organizations through informal channels (e.g. chance conversations, spontaneous meetings, personal notes, emails and phone calls, drinks after work)? *(independent variable, informal communication)* Federal 1. CBPc 2. EPAc 3. FEMAc 4. NWSc 5. NOAAc 6. OCMc 7. USACEc Texas 8. TAHCc 9. DADSc 10. TDEMc 11. DSHSc 12. TXDOTc 13. TGLOc Local Organizations 14. CCc 15. COBc 16. COHc 17. SPIc 18. COMc 19. COWc 20. CBRACc 21. HCc 22. LRGVDCc 23. POBc 24. WCc NGOs 25. ARCc 26. GOMAc 27. RGVFBc 28. SAc University 29. TSGc 30. UTRGVc	2=occasionally 3=regularly

2.4 How often has your communications with people from this organization, or documentation from it, enhanced your knowledge of <u>community resiliency</u>? *(weak influence dependent variable)* <u>Federal</u> 1. CBPd 2. EPAd 3. FEMAd 4. NWSd 5. NOAAd 6. OCMd 7. USACEd <u>Texas</u> 8. TAHCd 9. DADSd 10. TDEMd 11. DSHSd 12. TXDOTd 13. TGLOd <u>Local Organizations</u> 14. CCd 15. COBd 16. COHd 17. SPId 18. COMd 19. COWd 20. CBRACd 21. HCd 22. LRGVDCd 23. POBd 24. WCd <u>NGOs</u> 25. ARCd 26. GOMAd 27. RGVFBd 28. SAd <u>University</u> 29. TSGd	3-point scale: 1=never 2=occasionally 3=regularly

30. UTRGVd	
2.5 How often has communicating with people in the following organization led you to make professional choices or decisions that you would not have otherwise made? *(moderate influence dependent variable)* <u>Federal</u> 1. CBPe 2. EPAe 3. FEMAe 4. NWSe 5. NOAAe 6. OCMe 7. USACEe <u>Texas</u> 8. TAHCe 9. DADSe 10. TDEMe 11. DSHSe 12. TXDOTe 13. TGLOe <u>Local Organizations</u> 14. CCe 15. COBe 16. COHe 17. SPIe 18. COMe 19. COWe 20. CBRACe 21. HCe 22. LRGVDCe 23. POBe 24. WCe <u>NGOs</u> 25. ARCe 26. GOMAe 27. RGVFBe 28. SAe <u>University</u>	3-point scale: 1=never 2=occasionally 3=regularly

29. TSGe 30. UTRGVe	
2.6 To what extent have your communications with people at this organization led you to rethink your approach to <u>natural disaster preparedness</u>? *(strong influence dependent variable)* <u>Federal</u> 1. CBPf 2. EPAf 3. FEMAf 4. NWSf 5. NOAAf 6. OCMf 7. USACf <u>Texas</u> 8. TAHCf 9. DADSf 10. TDEMf 11. DSHSf 12. TXDOTf 13. TGLOf <u>Local Organizations</u> 14. CCf 15. COBf 16. COHf 17. SPIf 18. COMf 19. COWf 20. CBRACf 21. HCf 22. LRGVDCf 23. POBf 24. WCf <u>NGOs</u> 25. ARCf 26. GOMAf 27. RGVFBf 28. SAf	3-point scale: 1=not at all 2=a little bit 3=very much

University 29. TSGf 30. UTRGVf	
2.7 How often have people in the following organizations contacted you for guidance? Federal 1. CBPg 2. EPAg 3. FEMAg 4. NWSg 5. NOAAg 6. OCMg 7. USACg Texas 8. TAHCg 9. DADSg 10. TDEMg 11. DSHSg 12. TXDOTg 13. TGLOg Local Organizations 14. CCg 15. COBg 16. COHg 17. SPIg 18. COMg 19. COWg 20. CBRACg 21. HCg 22. LRGVDCg 23. POBg 24. WCg NGOs 25. ARCg 26. GOMAg 27. RGVFBg 28. SAg University 29. TSGe 30. UTRGVe	3-point scale: 1=not at all 2=a little bit 3=very much

2.8 Do you discuss the following with [agencies selected in question 2.1]?	1 = Coastal hazard identification 2 = Flood mitigation 3 = Risk reduction 4 = Hurricane preparedness 5 = Communicable disease preparedness 6 = Memorandums of understanding (MOUs)/ Mutual Aid Agreements 7 = Not applicable

SECTION 3

3.1 How often do you communicate local disaster mitigation planning and preparedness efforts with neighboring Mexican government counterparts?	3-point scale: 1=not at all 2=occasionally 3=frequently
3.2 Which of the following information distribution channels does your organization utilize to disseminate disaster preparedness information to the Spanish-speaking population? Select all that apply.	1 = Television 2 = Radio 3 = Newspapers 4 = Public events 5 = Social media – Facebook, Twitter 6 = Promotoras 7 = Pamphlets 8 = Posters 9 = Churches 10 = Clinics 11 = Billboards 12 = None of the above 13 = Other: Text box
3.3 Do you participate in the following local disaster mitigation planning & preparedness activities?	1=Y/2=N/3=NA for following topics Development of regional preparedness plans Preparedness seminars or workshops Preparedness tabletop exercises Preparedness drills Full-scale exercises Texas Division of Emergency Management Conference FEMA Emergency Management Institute Trainings TEEX Training

	Regional Hazard Vulnerability Analyses
3.4 How often does federal agency guidance get implemented in local mitigation planning and preparedness activities?	3-point scale: 1=not at all 2=a little bit 3=very much
3.5 Which organizations are the most influential to you, in your professional role, in emergency management and/disaster preparedness? In what ways? COMMENTS	Text box
3.6 Is there anything that has not been covered in this survey that you would like to add? COMMENTS	Text box

Interview Guide

Hi! Thank you for taking time to talk to me this morning/afternoon. I will ask you some questions regarding your experience with preparedness and your opinions about collaboration with other partners/organizations in reaching the goal of community resilience.

Background in field

1) What is your role in your agency? What do you do?
2) How long have you been working in the field? What kind of disaster planning & preparedness training have you been provided with?
3) Can you tell me about the experiences you have had in local disaster planning & preparedness in the Rio Grande Valley?
4) Tell me about your greatest challenge in your role.

Networking questions

5) What information do you communicate with other agencies/partners as it relates to local disaster planning & preparedness? Be as thorough as possible.
6) How is information communicated and who do you communicate with?
7) How often do you attend meetings as it relates to local disaster mitigation planning & preparedness with community partners and have these meetings proven to be valuable to you? Who is at these meetings?
8) How does your organization adapt to the increased impacts of natural disasters and the expectations from the public?
9) If you are part of any organizations or umbrella organizations that emphasize emergency preparedness, what are they? What role does your organization play?

Influence/trust

10) Which organizations contact you for (disaster planning & preparedness) guidance?
11) Which organizations are the most influential to you, in your professional role, within preparedness? In what ways?
12) What is your opinion of the local disaster mitigation planning & preparedness coordination in the Rio Grande Valley? Do you collaborate or see collaboration with neighboring Mexican counterparts?

Closing

13) Do you have additional comments?

BIOGRAPHICAL SKETCH

Cristina Madrid, a native of Brownsville, TX, graduated from Berea College in 2012 where she received a Bachelor of Science in Business Administration. She obtained her Master of Arts in Disaster Studies from The University of Texas Rio Grande Valley in 2018. In graduate school she completed a NOAA Experiential Research & Training Opportunity internship at the NOAA Office for Coastal Management in Silver Spring, MD and at the University of Maryland College Park. She can be contacted at cmadrid025@gmail.com.