

Collaborative emergency management: better community organising, better public preparedness and response

Naim Kapucu, Ph.D. Assistant Professor, Department of Public Administration, University of Central Florida, USA

Community coordination requires communication and planning of precautions to take when faced with a severe threat of disaster. The unique case of the four Florida hurricanes of 2004—Charley, Frances, Ivan, and Jeanne—is used here to assess community responses to repeated threats of hurricanes. The paper examines how effectiveness in coordinating community disaster response efforts affects future public preparedness. The findings suggest that pre-season planning, open communication between emergency managers and elected officials, and the use of technology all had a significant impact on community responses. The repeated threat scenario indicates that emergency managers must work vigilantly to keep residents informed of the seriousness of a situation. The study describes how emergency managers in Florida countered public complacency during four hurricanes in six weeks. The strategies identified as useful by public managers in the context of hurricanes are applicable to other natural and man-made disasters.

Keywords: community coordination, disaster management, disaster response operations, hurricanes, public preparedness, repeated threats

Introduction

Mass chaos ensued in New Orleans, Louisiana, when Hurricane Katrina breached the city's levees in late August 2005, filling it with water and leaving any remaining citizens stranded. Tens of thousands of people, along with city and state officials, were without resources for nearly five days (Dyson, 2006). These unexpected results exemplify the inherently social nature of disasters and emergencies. **The ability to respond is largely determined by the social structures and processes in place when a community suffers a man-made or natural disaster** (Schneider, 1995; Pellig, 2003; Kreps, 1989).

Unlike the bedlam that followed Hurricane Katrina, the state of Florida dealt with the eventful 2004 hurricane season with relative control and composure. Four hurricanes hit the Florida peninsula in six weeks and each time one approached, the National Hurricane Center established watches and issued warnings to the general public for the purpose of preparedness. Yet even in a location with a history of hurricanes and with disaster management and planning protocols in situ, citizens—professionals and laypersons alike—were still surprised by the extent and the ferocity of the disasters that occurred. The repeated threats posed by Hurricanes Charley, Frances, Ivan, and Jeanne provided a unique opportunity to research the state of public preparedness and community coordination strategies in order to improve preparedness in the state of Florida.

Box 1 The hurricanes of 2004: case descriptions

Hurricane Charley

The eye of Hurricane Charley, with winds of 145 miles per hour, hit land on 13 August near Cayo Costa in southwest Florida and travelled across the centre of the state, including Orlando. Charley followed a northeast track across the state and attained sustained winds of 60–70 miles per hour. The eye passed over the coast near Daytona Beach before heading back into the Atlantic Ocean. Charley took approximately nine hours to traverse the Florida peninsula and was the strongest hurricane to make land in the state since Hurricane Andrew of 1992.

Hurricane Frances

The eye of Hurricane Frances, with winds of 105 miles per hour, hit land on 5 September at Sewall's Point, north of West Palm Beach, and travelled across central Florida. Frances was downgraded to a tropical storm later and soon after emerged in the Gulf of Mexico, making land for the second time on the afternoon of 6 September, at the Florida Big Bend, near Tallahassee. Unlike Charley, which will be remembered for wind damage, Frances will be recalled most for flooding, including freshwater and tidal storm surges.

Hurricane Ivan

The eye of Hurricane Ivan, with winds of 130 miles per hour, hit land on 16 September at Gulf Shores, Alabama, causing major structural damage in Pensacola and flooding in central Florida. By early afternoon on 16 September, as it moved across central portions of the state, the hurricane had been downgraded to a tropical storm. Widespread beach erosion and major flash flooding occurred throughout the region—the Interstate 10 bridge over Escambia Bay partially collapsed after water levels of more than 15 feet in height pushed sections of the road off their supports and into the bay. Ivan spawned numerous tornadoes, especially over portions of Bay, Holmes, and Escambia Counties in Florida, as well as Baldwin County in Alabama.

Hurricane Jeanne

The eye of Hurricane Jeanne, with winds of 120 miles per hour, hit land on 25 September on Hutchinson Island, close to Frances' point of contact, and travelled through central Florida on a northward trajectory into Georgia. The greatest storm tide occurred on Florida's east coast close to where Jeanne made landfall. Fortunately for these areas, Jeanne hit land at approximately low tide.

Source: FSEOC, 2004.

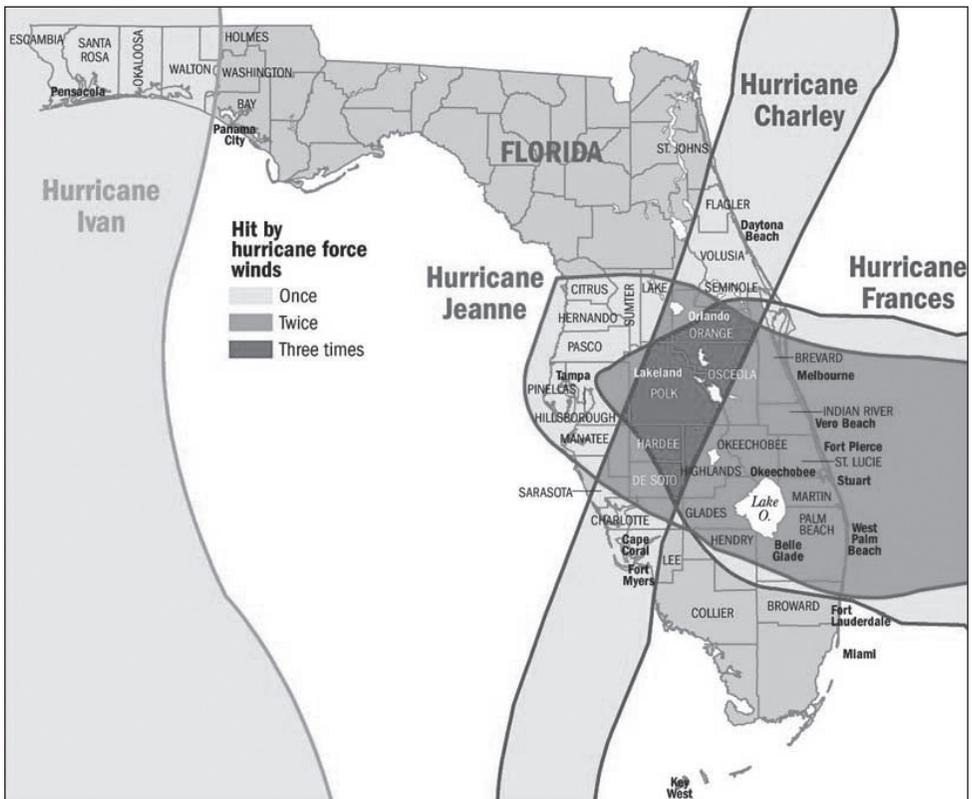
The four hurricanes occurred between 13 August and 25 September 2004 (see Box 1) and were characterised by major winds (Hurricane Charley, for instance, was a Category 4) and flood levels of rainfall (Hurricanes Frances and Jeanne, for example, deposited 13 inches of water in Brevard County). The four hurricanes also caused severe structural damage—Hurricane Ivan, for instance, was responsible for the collapse of a major bridge over Interstate 10 (FSEOC, 2004; Bell and Smith, 2004). Table 1 shows that these hurricanes affected each of the 67 counties in the state of Florida; every county experienced a hurricane or tropical storm¹ two or three times, some four times. Residents of every Florida county filed insurance claims because of at least one of the four hurricanes, making this the most costly season ever. Students from every county missed at least one day of school because of a hurricane (Newman, 2004).

Central Florida was hit by three of the four hurricanes (Charley, Frances, and Jeanne) (see Figure 1) and the panhandle of Florida was struck by two (Ivan and Jeanne). Damage in Florida due to the four hurricanes is estimated at USD 26 billion (Holan, 2004), while in the United States as a whole it is believed to be USD 42 billion (NCDC, 2004; US House of Representatives, 2006). The four hurricanes claimed the lives of 117 people in the state of Florida and several thousands in the Caribbean Islands.

Table 1 Counties and cities affected by the 2004 hurricanes

County or City*	Hurricane			
	Charley	Frances	Ivan	Jeanne
Alachua		X	X	X
Baker		X	X	X
Bay			X	X
Bradford		X	X	X
Brevard	X	X		X
Broward		X		X
Calhoun		X	X	X
Charlotte	X	X		X
Citrus	X	X		X
Clay		X	X	X
Collier	X	X		X
Columbia		X	X	X
Miami-Dade		X		X
Miami*		X		X
Desoto	X	X		X
Dixie	X	X	X	X
Duval		X	X	X
Jacksonville*		X	X	X
Escambia			X	X
Flagler	X	X		X
Franklin		X	X	X
Gadsden			X	X
Gilchrist		X	X	X
Glades	X	X		X
Gulf			X	X
Hamilton		X	X	X
Hardee	X	X		X
Hendry	X	X		X
Hernando	X	X		X
Highlands	X	X		X
Tampa*	X	X		X
Hillsborough	X	X		X
Holmes			X	X
Indian River	X	X		X

Jackson			X	X
Jefferson		X	X	X
Lafayette		X	X	X
Lake	X	X		X
Lee	X			X
Leon		X	X	X
Tallahassee*		X	X	X
Levy	X	X	X	X
Liberty			X	X
Madison		X	X	X
Manatee	X	X		X
Marion	X	X		X
Martin	X	X		X
Monroe	X			X
Nassau		X	X	X
Okaloosa			X	X
Okeechobee	X	X		X
Orange	X	X		X
Orlando*	X	X		X
Osceola	X	X		X
Palm Beach	X	X		X
Pasco	X	X		X
Pinellas	X	X		X
Polk	X	X		X
Putnam	X	X		X
Sarasota	X	X		X
Santa Rosa			X	X
Seminole	X	X		X
St. Johns	X	X		X
St. Lucie	X	X		X
Sumter	X	X		X
Suwannee		X	X	X
Taylor		X	X	X
Union		X		X
Volusia	X	X		X
Walton			X	X
Washington			X	X
Wakulla		X	X	X

Figure 1 The paths of the 2004 hurricanes

Source: National Weather Service/National Hurricane Center.

Organising a community response is a major problem for government officials tasked with trying to ensure effective public reactions to repeated threats to their health and safety (Drabek, 2003; Fitzpatrick, 1999). Repeated hurricane threats and warnings—as with disease and terrorism—can cause numbness within a community, resulting in underestimation and under-preparedness, and hence increased public exposure to imminent dangers. This, in turn, may lead to additional loss of life and property and a slower rate of recovery (Burby, 1998; Williams and Olaniran, 1998). Many Florida residents are well aware of the risks posed by hurricanes, and the hurricane warning system is increasingly effective in providing people with timely alerts to protect themselves and their property and to move inland. However, this knowledge and infrastructure was to be tested by the high incidence of hurricanes in 2004 and by many more ‘close calls’ or ‘nonevents’.

This study attempts to answer the following questions: how did county emergency managers encourage a community response under conditions of repeated hurricane threats? How can one apply the strategies used in Florida in other disaster contexts? What conclusions can be extracted from the 2004 hurricane season to improve community coordination in future emergencies and catastrophes? How did emergency

managers protect businesses, individuals, and property from natural dangers by creating disaster resilient communities?

The study contributes to the emergency management literature and specifically to community organising and public readiness in response to disasters (Pellig, 2003; Seeger, Sellnow and Ulmer, 2003; Tierney, Lindell and Perry 2001; Waugh, 2000; Fischer, 1998; Dynes and Tierney, 1994; McLoughlin, 1985; Quarantelli and Dynes, 1977). Waugh (2006) recommended that Florida's emergency management system should be viewed as a model for the entire United States.

The theoretical framework

A commonly used model of emergency management consists of four elements: mitigation; preparedness; response; and recovery. Mitigation refers to those actions that prevent a disaster, reduce the chance of it happening, or lessen its damaging effects. Preparedness refers to those actions taken before impact, including plans. Response refers to actions taken during the initial impact of a disaster, including those to save lives and to prevent further damage to property. Recovery refers to those actions taken after the initial impact, including those aimed at achieving a return to normality (Daniels, Kettl and Kunreuther, 2006; FEMA, 2004; Wood, 2004; Haddow and Bullock, 2003; McEntire, 2002; Farazmand, 2001; Waugh, 2000; 1994; Comfort, 1999; Peacock, Morrow and Gladwin, 1997; Schneider, 1995; White and Haas, 1975).

It is pre-disaster conditions and policies that create social and structural vulnerability, putting some segments of society at greater risk than others (Nigg, 1995; Otway and Wynne, 1989). Successful participation in pre-disaster, consensus-building emergency planning processes can lead to strengthened organisational relationships that improve the effectiveness of response operations and community coordination. The major function of community coordination at this stage is to communicate messages related to public preparedness as well as to educate members of the public in effective preparations for a potential disaster and to encourage them to take part. Such community preparedness can play a role in the response stage for early warning, evacuation plans and strategies, and detailed situation reports on ongoing disasters (Kapucu, 2005; Waugh, 2000; Mileti, 1999; Schneider, 1995; Dynes and Tierney, 1994; Baker, 1991; McLoughlin, 1985).

Particular agencies or groups are associated with these emergency management phases. In highly simplified terms, mitigation is often the preserve of engineers who take a structural approach to disaster damage. Preparedness is the realm of emergency planners who construct plans to minimise the effects of hazards and emergencies. Response is frequently the sphere of the first responders, such as fire, health, and police services. Recovery tends to be the field of local authority service providers, such as care managers and housing departments.

While there is nothing inherently wrong with having particular lead agencies at a given stage, it can result in the exclusion of other perspectives, to the detriment of a holistic disaster management approach (Choi, 2004; Wood, 2004; McEntire et al.,

2002; Fordham, 1999; Mileti, 1999; Ketteridge and Fordham, 1998). In Florida, the Comprehensive Emergency Management Plan (CEMP) directs the emergency response function. The CEMP outlines the response and recovery operations that are to take place upon the declaration of a state of emergency by the State Emergency Response Team (SERT). The SERT is responsible for coordinating the state-wide emergency response led by the State Coordinating Officer. The SERT Chief oversees five functions: Operations; Information and Planning; Administration; Logistics; and Recovery Transition. 'The State of Florida uses a "closest appropriate responder" concept when responding to any threat, event, or disaster' (FDEM, 2004, p. 15). In line with this concept, the first responders often come from the local municipality or county.

Florida statutes mandate that all 67 counties must have an emergency response plan that provides disaster management to local residents. The SERT works as an umbrella agency coordinating state resources and local needs. The state has adopted an emergency support function approach under which a state agency is made the lead agency for each of the 17 emergency support functions (ESFs); a structure that 'is compatible with the current organizational structure used by FEMA' (FDEM, 2004, p. 17). The state agency is selected based on available resources, authority, and capabilities needed to fulfil the emergency management function (FDEM, 2004).

Complex adaptive systems theory (Cleveland, 2002; Comfort, 1999), sense-making theory (Weick, 1995; 1993), and organisational learning theory (Cohen and Sproull, 1996; Argyris and Schön, 1978; 1996) are useful in examining holistically community response and coordination in a dynamic and continuously evolving disaster environment. Comfort (1996) notes, in the context of earthquake research, the inappropriateness of simple, linear models in capturing the conditions of disaster environments where 'there are too many agents involved in performing too many different functions simultaneously under radically altered conditions to attribute direct, linear causality to any one agent or condition' (Comfort, 1996, p. 3). Disaster events 'produce unique combinations of choices, actions, and reasoning that could not be predicted' (Comfort, 1996, p. 3). Complex adaptive systems theory better represents the complexity of disaster situations and the problematic nature of some post-event evaluations.

Karl Weick provides insight into community coordination via his theory of sense-making. Weick (1993; 1995) states that information is the common raw material that all organisations and individuals possess. The information an organisation receives is often equivocal or ambiguous, meaning that a given message has more than one possible interpretation. The goal of organising is to make sense of this equivocal information. **Through communication, participants collectively interpret and make sense of the information in their environment** (Kapucu, 2006a; McEntire et al., 2002; Coombs, 1999). **Timely, transparent, and comprehensive information dissemination allows for informed decision-making in the field of community coordination.**

Organisational learning theory is an additional tool with which to understand community coordination in response to a disaster. The scope and complexity of emergency response operations necessitate a flexible learning approach that involves each

of the emergency management agencies and the public in adjusting their performance in accordance with changing conditions and the demands on other organisations also engaged in emergency preparedness and response processes (Weick and Sutcliffe, 2001; Weick and Roberts, 1993). Organisations and individuals learn through processes of knowledge acquisition, information dissemination, information interpretation, and organisational memory. Disasters may induce organisational learning. 'New knowledge, understanding, and insights, for example, often arise as a consequence of crisis. Crisis creates a time of intense self-reflection and debriefing as members actively seek to understand what went wrong and why. Information is rapidly distributed during a crisis because of heightened and unified attention. Because crisis creates high uncertainty by disrupting established expectations and prompts the search for information' (Seeger, Sellnow and Ulmer, 2003, p. 18).

Disasters have a very low or unknown probability of occurring ('low-probability events'), but if they do happen, they generate enormous losses. As such, they compete for attention with the priorities of daily living. Often, getting the public to participate in disaster preparedness is difficult. One of the social realities that disaster planning must face is that the general attitude to disaster preparedness is characterised by public complacency (Drabek, 1987; 1986). It is important to understand this phenomenon for three reasons: to examine how it can be influenced; to discover how it can be circumvented; and to develop a realistic appreciation of the limitations it imposes. Public complacency towards disaster preparedness pervades governmental bodies as well as the public at large. There is some overlap here because the priorities of governments are influenced by those of their constituencies (Auf der Heide, 1989).

Public complacency (apathy) in response to a disaster is a major problem for government officials trying to ensure effective public responses to repeated threats of disaster (Heath and Millar, 2004; Drabek, 2001; Fitzpatrick, 1999). As with public safety and disasters, repeated threats and warnings cause numbness among the public, resulting in underestimation and under-preparedness, and hence lead to increased public exposure to imminent dangers. This, in turn, may cause additional loss of life and property and slow recovery (Partnership for Public Warning, 2002; Burby, 1998; Williams and Olaniran, 1998). Tierney, Lindell and Perry (2001) suggest that there is a direct correlation between preparedness and level of experience: the more an individual, household, or organisation has been exposed to disasters the more prepared they tend to be.

Community coordination to counteract public complacency is important for four main reasons:

- First, some communities may be unaware of the threat due to a lack of information. Following a natural disaster, electricity may be unavailable, cutting off the internet and other information sources. Devastation caused by disasters can be reduced by mitigation, public awareness, and effective community coordination (Kapucu, 2006b; Points of Light Foundation, 2004; McEntire, 2002; Pielke and Pielke, 1997).
- Second, conflicting or inconsistent information or recommendations may cause the public to disregard or discount information or to act selectively on information that

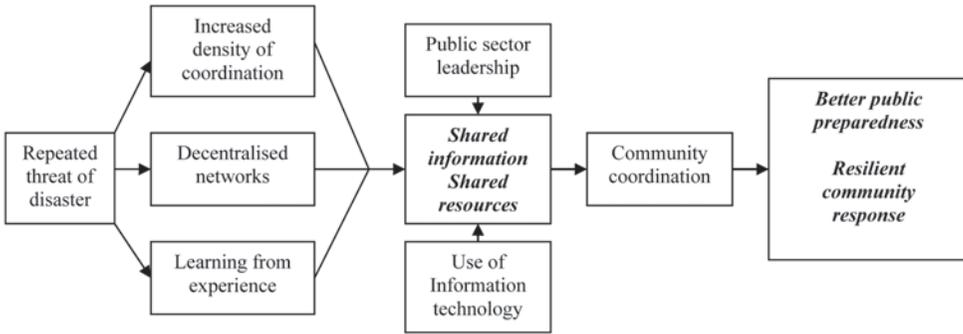
- is consistent with their preferences, perhaps because it results in the least inconvenience (Perry and Lindell, 2003; Fitzpatrick, 1999; Tobin and Montz, 1997).
- Third, repeated past warnings may have failed to impact on citizens, causing them to underestimate future events. For example, community under-preparedness may stem from a lack of terrorist attacks after repeated warnings from national terrorist alert systems (Seeger, Sellnow and Ulmer, 2003; Waugh, 2000; Coombs, 1999).
 - Fourth, when citizens believe that they are unable to implement a recommended response, or when they think it is ineffective, they may focus on controlling their fear of the risk by denying or minimising the perceived threat level or even by reacting angrily towards those trying to help them or to convince them of its seriousness (Taylor, 2002; Tierney, 2000; Schneider, 1995; Mileti and O'Brien, 1992; Mileti and Sorensen, 1990; Smart and Vertinsky, 1977).

Of course, the above explanations assume aggregate responses. It has been observed, though, that whereas many people may adopt a complacent attitude with regard to preparedness, at least a few communities overreact to disasters and dramatise the information supplied to them (Mileti, 1999; Fischer, 1998; Carter, 1979).

Natural disasters create an opportunity for government intervention (Trebilcock and Daniels, 2006). This study examines factors affecting local public officials' willingness to implement community coordination strategies as emergency managers responsible for local jurisdictions, with federal and state assistance. For example, larger jurisdictions and those with experience of disasters are more likely to have dedicated professional staff and resources to ensure that community coordination strategies are developed and implemented (Tierney, Lindell and Perry, 2001). Other factors, though, such as a flexible organisational structure, may also play a role, because the complexity of information makes the bureaucratic communication system dysfunctional (Kapucu, 2006a; Comfort, 1999; Tobin and Montz, 1997). In addition, previously developed relationships with other public agencies, private agencies, and non-profit agencies, prior relationships with local media, the presence of well-trained personnel with communication and analytical and leadership skills, and support from elected officials are influential (see Figure 2). Finally, the carrying out of emergency exercises with, inter alia, schools, special care facilities, hospitals, and those industries that possess extremely hazardous materials, and which draw on current information technology (IT), increase the likelihood of successful community coordination in response to a disaster (McEntire, 2002; Tierney, 2000; Fitzpatrick, 1999).

Hurricanes are highly destructive events and are somewhat unpredictable in their behaviour, 'yet there are many ways to minimize disasters, and the most effective ones involve heightened communication with first responders and communities at risk' (Bristow, 2004, p. 20). Emergency response operations are more effective when leadership is working through an emergency operation centre (EOC). Emergency response operations are also more effective when the organisations from different sectors interact with one another prior to a disaster. Pre-disaster communication is a key aspect of truly effective community preparedness and response (Drabek, 2003;

Figure 2 Coordinated community response to a disaster



Tierney, Lindell and Perry, 2001; Tobin and Montz, 1997; Dynes and Tierney, 1994). Successful participation in these pre-disaster, consensus-building emergency planning processes can lead to strengthened organisational relationships and thus improve post-disaster action.

Methods

A survey was sent to emergency managers in all 67 Florida counties in autumn 2004, as well as to four cities with EOCs and the state emergency management office. Following a pilot survey, three rounds of mailings occurred, generating 66 responses at a rate of 92 per cent. Most of the questionnaires (83.4 per cent) were completed by the addressees; the remainder, 16.6 per cent, were filled in by assistant directors or public information officers. 85.9 per cent of respondents said that they are familiar or very familiar with emergency management in their jurisdictions. Respondents stated that on average, they have worked for 19.6 years in government, of which 10.4 years has been spent in their present jurisdiction as emergency managers. Respondents average 7.6 years of experience in emergency management. Among respondents as a whole, 92.2 per cent stated that they are familiar or very familiar with emergency management in their jurisdictions.

In addition to the survey responses, we also reviewed SERT *Situation Reports* before, during, and after the hurricanes. The Florida State Emergency Response Team produced *Situation Reports*, made available to the public daily and weekly, that outlined current response efforts being monitored by the State Emergency Operations Center (SEOC). Content analysis was performed on all *Situation Reports* for each of the four hurricanes. Under the data collection process, organisations were numbered and catalogued, the date and storm were recorded, and the agency contact, sector, and source of funding were noted. The transactions reported centre on the response effort monitored by SERT *Situation Reports*.

Twelve in-depth interviews were conducted over the telephone and in person with respondents whose counties were affected by three or more hurricanes during the

2004 season. Their purpose was to assess views regarding the adequacy of current efforts and the role of emergency managers in the process. The interviews provided additional insight into and understanding of current emergency management efforts. To evaluate the community reaction to hurricanes, we reviewed the response reported by major media outlets in Florida. All of the main newspapers in the state were given consideration based on proximity to storm paths, the size of the metropolitan area that each represents, and availability of issues for review. The *Miami Herald*, *Tampa Tribune*, *Jacksonville Times-Union*, and *Tallahassee Democrat* were excluded because all issues spanning the hurricane season were not available. The *Orlando Sentinel* was available for content analysis and was chosen because of its closeness to three of four major storms (Charley, Frances, and Jeanne) and its central location throughout the state. Content analysis began with the 1 August 2004 issue (because there were no reported storms in June or July) and ran through to 30 November 2004. Each issue was examined for articles detailing the community reaction to storm preparation, storm action, or post-storm response. Each entry was numbered by date, organisations were listed separately and given numbers, the contact, sector, and source of funding were identified, and the transaction was recorded. A note was made of organisations that worked together to accomplish a task and any articles reporting public complacency towards the storms were highlighted.

Findings and results

The following section looks at how effectiveness in coordinating community disaster response efforts affects public preparedness, using the 2004 hurricanes as evidence. The strength of community organisations, local government, and private sector bodies in place to promote coordination, cooperation, and effective response operations was

Table 2 Organisations involved in the response to the 2004 Florida hurricanes

Organisations	Number	Per cent
Public organisations		
Public-federal	16	7
Public-state	35	15
Public-regional	5	2
Public-county	66	28
Public-city	29	13
Total public organisations	151	65
Non-profit organisations	18	8
Private organisations	63	27
Total organisations	232	100

Sources: Orlando Sentinel, 1 August–30 November 2004; SERT Situation Reports, 1 August–30 November 2005.

observed in this study to identify the areas that have the greatest impact on response (Kreps, 1989). As Table 2 indicates, 232 public, private, and non-profit organisations were recorded as having responded to the aftermath of the 2004 hurricanes. Based on the *Orlando Sentinel* content analysis, 65 per cent of responding organisations were from the public sector, including the Federal Emergency Management Agency (FEMA), the Office of the President, and county and city municipalities.

In central Florida, a hurricane had not affected local government, such as that of Orange County, in nearly 40 years. The swift shift in trajectory of Hurricane Charley forced Orange County and its municipalities to evacuate low-lying areas and mobile homes in four hours. The urgency of the evacuation required Orange County to work with neighbouring county governments and non-profit organisations in order to accommodate all of the unprepared residents. Mutual aid agreements between counties and cities were harnessed and their strength tested at the height of the emergency (Detwiler, 2004). Police officers drove through impoverished central Orlando and used bullhorns to inform residents of where they could get free transportation to shelters.² Individual Floridian volunteers, National Voluntary Organizations Active in Disasters (NVOAD), local volunteer organisations, and local government agencies coordinated their efforts in response to the unprecedented events (Points of Light Foundation, 2004).

Community coordination during the 2004 hurricane season

FEMA was active from the beginning of the 2004 hurricane season (US House of Representatives, 2006). Florida Governor Jeb Bush declared a state of emergency during each of the four hurricanes, authorising the SERT to activate the SEOC, and started to prepare state residents for pending disaster. Each of the 17 ESFs has a dedicated staff member in the EOC during response operations. The SERT relies heavily on the efforts of local and county emergency management agencies to prepare their communities for disaster. 'Achieving and maintaining effective citizen and community preparedness reduces the immediate demands on response organizations' (FDEM, 2004, p. 11), allowing response organisations to help residents who are unable to aid themselves. In Florida, it is the responsibility of the county emergency management offices to coordinate local resources in response to a disaster.

Successful participation in these pre-disaster, consensus-building emergency planning processes can lead to strengthened organisational to disasters. Communicating with the public is also important before a storm is forecast and hits land. 'One of the messages we frequently tell Floridians is that a storm is not just a skinny black line on the hurricane tracking map, meaning hurricanes do not only affect a small forecasted area, but a very vast area, so all residents need to be prepared' (Bush, 2005). The communication of this and other messages seeks to make people listen and to take direction from trusted leaders. Providing accurate information immediately before and after a storm reassures citizens that their government is responding to their plight.

Across the state, emergency managers were surveyed about their use of strategies to coordinate the community and to make sure that necessary information was being

Table 3 Community coordination strategies used during the 2004 hurricane season

Community coordination strategies	Per cent*
Emergency communication procedures available and utilised	86
Held pre-season coordination meetings with local community organisations	80
Developed strategies to deal with rumours in a timely manner	80
Had a notification plan that provided an immediate threat alert to all public or private agencies	80
Used information technology to improve emergency communication and coordination	79
Held regular meetings on hurricane-related issues with public officials and community organisations	77
Utilised a provision in the emergency plan for a single news media point of contact	73
Conducted pre-season coordination meetings with the local media	70
Carried out emergency management exercises that included schools, special care facilities, hospitals, and those industries with extremely hazardous materials	66
Mean	76.7
Cronbach Alpha (9 item strategy)	0.876

* Percentages shown represent 'agree' and 'strongly agree' responses.

processed. Table 3 details the most frequently used strategies employed by emergency managers. Florida emergency managers found it important to make sure that all parties were informed about and prepared to deal with any possible situation. Eighty per cent of respondents approached community coordination with 'tabletop' exercises or pre-season coordination meetings, and 86 per cent agreed or strongly agreed that emergency communication procedures were made available and utilised. In preparation for the 2004 hurricane season, the City of Orlando practised its 'response' to a large Category 4 hurricane that crossed the central section of the state, causing excessive wind damage to homes and trees and flooding.³ This exercise was followed by Hurricane Charley, a Category 4 hurricane, and the first to cross central Florida since 1969.

In addition to pre-coordination meetings, respondents also agreed that the development of strategies to counter rumours in a timely manner (80 per cent), a plan to alert all agencies of a threat (80 per cent), and the use of IT to improve communication and coordination among agencies (79 per cent) were effective coordination strategies. Orange County, Florida emergency managers used 'E-Team' (resource management software) to manage all incoming response operations information from the city and geographic information systems (GIS) to map areas.⁴ Across the state, the Florida Division of Library and Information Services maintained a disaster recovery website that provided information on how to prevent or deal with the destruction of state heritage through water damage caused by the hurricanes (Goodwin, 2004). In contrast to the expected results, respondents were not as supportive of coordination exercises with the local media and special organisations such as schools and special care facilities. Only 66 per cent conducted exercises with schools and

other facilities. However, support for the concept is growing because emergency managers view school-aged children as the basis of a prepared community. For example, one interviewee said that he supported teaching children about disaster preparedness because it would then become ‘second nature’ to them.³

Community preparedness for the 2004 hurricane season

Community coordination and the strategies employed are an important part of community awareness and preparedness measurement. Table 4 shows respondents’ agreement with statements regarding community awareness and responsiveness across the four hurricane disasters of 2004. The increase in agreement from one hurricane to the next suggests that with each recurring scenario, the awareness of members of the public of their surroundings rose. Because the four hurricanes occurred over a period of only six weeks, it was not possible to study emergency management strategies after each separate event. The last hurricane to hit land before Hurricane Charley in August 2004 was Irene in October 1999, as well as one tropical storm in 2001 and

Table 4 Community awareness of and responsiveness to the 2004 hurricanes

Community awareness	Charley (%)	Frances (%)	Ivan (%)	Jeanne (%)
The public was knowledgeable about the dangers of hurricane	66.7	84.9	84.6	88.7
The public paid significant attention to hurricane/tropical storm warnings	55.3	77.4	81.8	79.2
The public followed official public advisories for protecting life and property	53.2	66.0	88.6	65.4
The public was aware of hurricane	90.0	98.2	88.1	94.5
Mean	66.3	81.6	85.8	82.0
Cronbach Alpha (4 item preparedness)	0.827	0.920	0.933	0.918
Community responsiveness	Charley (%)	Frances (%)	Ivan (%)	Jeanne (%)
Many residents in the evacuation zone refused to evacuate	21.4	16.0	12.9	30.6
The public acted like nothing would happen	11.1	19.2	9.4	19.6
Parts of the community ignored the hurricane/tropical storm threat	16.3	17.3	18.8	29.4
The public was complacent about threat warnings and advisories	6.8	7.7	9.4	19.6
On average, hurricane shelters were used significantly below expectation	20.5	29.6	11.7	39.6
Mean	15.2	18.0	12.4	27.8
Cronbach Alpha (5 item preparedness)	0.850	0.784	0.856	0.873

* Percentages shown represent ‘agree’ and ‘strongly agree’ responses.

another in 2002 (National Hurricane Center, 2005). The irregular occurrence of tropical activity prior to the 2004 hurricane season preconditioned emergency managers, public officials, and the public and led them to take stable conditions for granted.

The low percentages of community awareness associated with Hurricane Charley highlight the complacency present after years of hurricane inactivity. Only 66.7 per cent of respondents felt that the public was knowledgeable about the dangers of hurricanes. Even fewer managers (55.3 per cent) agreed that the public heeded storm warnings, although 90 per cent of respondents confirmed that the public was aware of Charley. These numbers suggest that although members of the public were aware of the hurricane, possibly from sources such as the local media, they were not adequately informed about the dangers it posed, a situation generally associated with complacency. The alpha score, 0.827, indicates that the four survey items create a reliable scale for measuring awareness. The increase in respondents' agreement across the remaining three hurricanes shows that after the destruction of Charley, the following disasters garnered more attention and the public took them more seriously.

In addition to community awareness, respondents evaluated community responsiveness to preparedness procedures and strategies implemented before and during the disaster event. The low percentages in Table 4 are indicative of disagreement among respondents on negative statements regarding community unresponsiveness. The survey statements assumed that members of the public took no action or were not interested in responding to the threat of a dangerous storm. The respondents mostly disagreed with these statements, as evidenced by only 11.1 per cent agreeing that the public acted as if nothing would happen. Only 6.8, 7.7, and 9.4 per cent agreed that the public was complacent about threat warnings and advisories issued during Charley, Frances, and Ivan, respectively. As for Jeanne, 19.6 per cent of respondents agreed with the statement, suggesting an increase in complacency after three successive hurricanes.

A growing feeling of complacency is also evident by the increase in respondents' agreement with the statement that the public ignored evacuation orders: 21.4 per cent during Charley, only 16 per cent during Frances, and a low 12.9 per cent during Ivan, compared to a high 30.6 per cent during Jeanne. After Frances, the *Orlando Sentinel*⁶ reported that Florida Division of Emergency Management Director Craig Fugate had warned residents not to take hurricanes lightly, especially because Frances had not caused significant damage. Local emergency managers were also concerned because Jeanne was much more powerful than Frances.⁷ Other indications that the public was not as responsive during Jeanne include increased agreement with the statements that shelters were utilised below emergency managers' expectations (39.6 per cent) and that sections of the community ignored the tropical storm threat (29.4 per cent).

Table 5 highlights the key outcomes of community responses to the hurricanes. While items in Tables 4 and 5 were measured per hurricane, community responses were not because of the short time between events. The percentages represent agreement with the statement for the hurricane season as a whole. The preparedness of

Table 5 Community response during the 2004 hurricane season

Community response	Per cent*
Our public managers were well-informed about hurricanes	89
Had political support for emergency response activities	86
Our elected officials were well-informed about the hurricanes/tropical storms	82
Hurricane damage to lives was minimised	81
Were able to communicate critical information in a timely manner to the community organisations	71
Our residents responded well to the hurricanes	51
Our residents were eager to get the necessary hurricane material supplies	51
Our residents responded well to the tropical storms	50
Our residents were well-prepared for the tropical storms	48
Our residents were well-prepared for the hurricanes	40
Hurricane damage to properties was minimised	39
Mean	61
Cronbach Alpha (11 item response)	0.768

* Percentages shown represent 'agree' and 'strongly agree' responses.

community leaders scored well: 89 per cent of respondents agreed that public managers were well informed about the hurricanes. Eighty-six per cent agreed that there was political support for emergency response activities, while 82 per cent felt that the elected officials were well informed about the hurricanes. The ability of emergency managers to minimise the risk to life (81 per cent) and to communicate information to community organisations in a timely manner (71 per cent) received slightly lower marks, reinforcing the positive response to the hurricanes.

The response of the public to the hurricanes received mixed reviews. While most respondents (81 per cent) agreed or strongly agreed that the risk to life was minimised, only 50 per cent agreed or strongly agreed that residents were well prepared for the tropical hurricanes. The four key items dealing with the public response to the hurricanes only received about 50 per cent support from respondents. The respondents did not perceive the public to have reacted well to the hurricanes (51 per cent), to have been eager to get necessary supplies (51 per cent), or to have been well prepared for the hurricanes (40 per cent). The response to the hurricanes did not seem to minimise damage to property despite preparedness efforts (39 per cent). The results in Table 5 suggest that public managers were successful in managing communication and preparedness within the governmental agency but that they had less impact on the public at large and on areas of large scope, such as protection of property.

The mixed results for public responsiveness in 2004 call for consideration of possible strategies to improve the situation. Early in the season, when expectation of disaster is low, or after many quiet seasons, it is essential that public managers clearly

inform the public about the possible dangers posed by hurricanes. Our evidence suggests that while members of the public were aware of each event, they were not convinced of the immense danger surrounding them. Public managers can use local resources to produce hurricane dramatisations or other television specials—similar to what many people watch on the Discovery Channel. In addition to using local media sources as communication tools, public managers can address preparedness issues and communicate with the public during the off-season. In many cases, the first time that many citizens start to discuss what to do in an emergency is when a disaster is pending. Furthermore, spending a significant amount of time with children in middle and high schools, teaching them preparation and response tactics, is beneficial because they will then grow up as informed adults. Finally, the use of CERT in every neighbourhood creates a close social connection to those members of the community who may be disconnected from the community as a whole, such as those who do not speak English, the poor, and the homeless (Weaver, 2004).⁸

Community coordination strategies and public preparedness

This study seeks to discover how pre-disaster coordination and planning affects disaster response—past discussions have identified specific actions that occurred during hurricane planning and response in 2004. We should note that the data in Tables 4 and 5 were calculated as indices representing each variable, coordination strategies, and public response, accordingly. These two indices were measured to gauge their correlation with one another using Pearson's correlation. Pearson's correlation (r) between the community coordination strategies ($M=5.9963$, $S=0.83849$) and public response ($M=5.6278$, $S=0.70413$) is 0.449, $p<0.001$. This result supports the research assumption that the use of community coordination strategies by emergency managers enhances the public response to disasters (in this case, hurricanes).

Anecdotal evidence also lends credence to this finding. During the storms, local emergency management officials in Orange, Osceola, Seminole, and Volusia counties used the reverse 911 system to inform residents of evacuation orders⁹ and the 'public [was] pretty responsive'.¹⁰ The *Orlando Sentinel* also recorded that residents of central Florida were preparing for Hurricane France by purchasing plywood, generators, and other supplies to make last-minute improvements.

In a disaster, the normal means of communication—mobile telephones, landline telephones, the internet, and even radio frequencies—will most likely be inoperable. Emergency plans must include alternate methods of communication, so that in the event that communication is impossible, operations run as intended. Florida uses a state-wide radio system that allows emergency responders to communicate in a disaster, regardless of the frequency that they normally use. More than 200 public safety dispatch centres in every Florida county are able to connect to this system (Bush, 2005). Global Positioning Systems (GPS) can enhance coordination and pre-planning in response to emergencies. For instance, in the event of a hurricane, GPS can assist in identifying which populations need to evacuate, and which do not. Besides technology, addressing communication and coordination begins with

developing relationships between people. Public officials must establish relationships between municipalities and agencies before a disaster strikes. Pre-existing trust is vital for effective coordination in an emergency (Kettl, 2005). Among other factors, high performance in a disaster depends on coordination and the development of positive, trusting relationships between emergency agencies and responders that permit the suspension of rules due to unexpected needs.

Working closely with the media and relaying messages to the public are important aspects of disasters that necessitate planning. The media can help with or hinder a disaster response, depending on the level of cooperation with localities. For example, after Katrina, the media saturated news channels with images of looters, dead bodies in the street, and people trapped on roofs. Such intense imagery can influence the public, as well as emergency responders. In New Orleans, media coverage of plunderers pressured police into stopping the pillaging, although initially this may not have been their first priority (Swope and Patton, 2005). The media can serve as a tool that aids disaster response, as evidenced by the public's contribution of USD 1.4 billion after a national television appeal following the events of 11 September 2001.

Another lesson to be learned from Florida's disaster management experience is that many people do not listen to the government. After Katrina, approximately 100,000 people remained in New Orleans, ignoring the mandatory evacuation. According to a poll conducted by the *Washington Post*, more than one-half of evacuees admitted that they could have left the city before Katrina hit land, but they chose to stay. The majority claimed that they did not believe that Katrina would be so devastating. State and local emergency managers need to address this issue; people who remain in disaster situations put themselves and emergency workers in danger (Swope and Patton, 2005).

Effective emergency management must be bottom-up; state and local governments must take responsibility first (Kapucu, 2006b; Waugh, 2006). However, the federal government also has an important role to play. Governor Bush stated in his testimony to the House of Representatives' Committee on Homeland Security that 'FEMA should serve as a conduit to the tremendous resources available at the federal level' (Bush, 2005). Under the 2005 National Response Plan, local governments must be prepared to sustain themselves for up to 72 hours before federal aid reaches a disaster area. If a local government needs assistance with preparation for or the response to a disaster, it is its responsibility to request help from the state government (Walters and Kettl, 2006; DHS, 2004).

Conclusion

Community coordination involves complex interaction among multiple government agencies, non-profit organisations, private business, and individual citizens. Large and seemingly unsolvable problems are best approached from a cooperative angle, combining resources and preventing duplication. Organising a cooperative effort, though, is almost as difficult as the problems that the initiative is created to address.

Trust and relationships among community bodies must be developed before a disaster strikes. Following the unexpected 2004 hurricane season, public managers and citizens of Florida alike navigated the maze of response and recovery. Public managers struggled to find the funds with which to meet unexpected expenses, such as debris removal, employee overtime, and utility repairs. Residents banded together to rebuild communities, such as Pensacola and Port Charlotte, that were severely damaged by the hurricanes. These communities also reviewed what they were able to save because of planning and coordination among entities. In the four hurricanes, 117 people died because of storm-related incidents that affected millions. Residents were able to go to multiple sources to help them rebuild their lives, such as the Department of Children and Families (for food stamps) and FEMA (for funds to pay for repairs). Coordination among the various supporting agencies has created resilient communities.

The study's results provide insight into public managers' perceptions of community coordination prior to disasters. Although public managers were not confident that their residents had knowledge of the dangers posed by hurricanes before Charley, they did not believe that the public was complacent about threats and warnings. However, public complacency is a reality and pervades successful responses. This suggests that residents were receiving the communications given by public managers and taking heed. Public managers were able to encourage community response through coordination with the local media, as well as with non-profit and private organisations. While many residents may not have been aware of the extent of the dangers associated with winds of more than 100 miles per hour, they were able to go to local retailers and purchase necessities. Retailers made an extra effort to provide residents with supplies.

In addition, emergency managers were supported by their elected leadership and were able to perform duties as needed with success. Although taken for granted, having the support of elected officials during the preparation and response phases ultimately affects whether an operation meets with success or failure. As witnessed after Hurricane Katrina in 2005, confusion and contention among the political ranks made providing necessary services to residents almost impossible. The 2004 hurricane season forced many agencies to rely heavily on mutual aid agreements and on communication among cities, counties, and jurisdictions.

Finally, technology, notably the internet, resource management technology, and geographic information systems, significantly aided the response efforts. Public managers, the media, and external entities were able to communicate throughout the disaster and thereby keep residents safe and ensure a return to normal living conditions as soon as possible. The combination of pre-planning and advanced technology aided public managers in protecting individuals and businesses. GIS were used to map power outages, flooding, and downed trees and power lines in order to provide first responders with a more accurate picture of the disaster environment. The maps created using GIS, coupled with emergency management resource management systems, were used to keep first responders and residents safe by organising all of the available information.

How can the strategies used in Florida be applied in other disaster situations? The strategies employed by Florida's public managers, such as pre-season planning exercises, community awareness seminars during the off-season, and education of citizens, are all applicable to other types of disasters, natural or man-made. Local governments preparing their communities for a possible disaster must maintain open lines of communication with elected officials as well as with the community. The attitude of Florida's emergency managers allowed them to communicate across cultures and to overcome language barriers, creating resilient communities during and after the hurricane events.

This study focused on disaster response and preparedness. Future research can concentrate on long-term recovery efforts by surveying residents and emergency management service receivers. This research is based on the perceptions of county emergency managers, rather than on those of other actors, such as citizens and community leaders, or other public and elected officials, whose opinions are also important. Future research can compare, again, the views of the receivers of emergency management services with the perceptions of emergency managers who coordinate the response and recovery operations.

Correspondence

Naim Kapucu, Ph.D., Assistant Professor, Department of Public Administration, University of Central Florida, HPA II Suite 238M, Orlando, FL 32816-1395, USA. Phone: +1 407 823 6096; fax: +1 407 823 5651; e-mail: nkapucu@mail.ucf.edu.

Endnotes

- ¹ The Federal Emergency Management Agency (FEMA) classifies hurricanes and tropical storms as follows: a tropical storm is an organised system of strong thunderstorms with a defined circulation and maximum sustained winds of 39–73 miles per hour (34–63 knots); and a hurricane is an intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 miles per hour (64 knots) or higher (FEMA, 2004).
- ² Content analysis of *Orlando Sentinel* news reports, 1 August–30 November 2004.
- ³ Interview with City of Orlando, Office of Emergency Management, 30 June 2005.
- ⁴ Interview with Orange County, Office of Emergency Management, 19 July 2005.
- ⁵ Interview with Seminole County, Office of Emergency Management, 15 July 2005.
- ⁶ Content analysis of *Orlando Sentinel* news reports, 1 August–30 November 2004.
- ⁷ Content analysis of *Orlando Sentinel* news reports, 1 August–30 November 2004.
- ⁸ Interview with City of Orlando, Office of Emergency Management, 30 June 2005.
- ⁹ Content analysis of *Orlando Sentinel* news reports, 1 August–30 November 2004.
- ¹⁰ Interview with Seminole County, Office of Emergency Management, 15 July 2005.

References

- Argyris, C. and D. Schön (1978) *Organizational learning: A theory of action perspective*. Addison Wesley, Reading, MA.
- Argyris, C. and D. Schön (1996) *Organizational learning II: Theory, method and practice*. Addison Wesley, Reading, MA.
- Auf der Heide, E. (1989) *Disaster Response: Principles and Preparation and Coordination*. The C.V. Mosby Company, St. Louis, MO.
- Baker, E.J. (1991) 'Hurricane Evacuation Behavior'. *International Journal of Mass Emergencies and Disasters*. 9(2). pp. 287–310.
- Bell, M. and W. Smith (2004) 'Seasons of Misery'. *Orlando Sentinel*. 28 November. pp. A1 and A16.
- Bristow, L. (2004) 'Emergency Notification Technology Improves Severe Weather Response'. *Disaster Recovery Journal*. 17(4). pp. 20–22.
- Burby, R.J. (1998) 'Natural Hazards and Land Use: An Introduction'. In R.J. Burby (ed.) *Cooperating with Nature: Confronting Natural Hazards with Land-Use and Planning for Sustainable Communities*. Joseph Henry Press, Washington, DC.
- Bush, J. (2005) 'Federalism and Disaster Response: Examining the Roles and Responsibilities of Local, State, and Federal Agencies—Testimony of Jeb Bush, Governor of the State of Florida before the House Committee on Homeland Security'. 19 October.
- Carter, T.M. (1979) *Community warning systems: the interface between the broadcast media, emergency service agencies and the National Weather Service*. Department of Sociology, University of Minnesota, St. Paul, MN.
- Choi, S.O. (2004) 'Emergency Management Growth in the State of Florida'. *State and Local Government Review*. 36(3). pp. 212–226.
- Chriszt, M. (2004) 'Hurricanes Raise Questions about Florida's Outlook'. *EconSouth*. 6(4). <http://www.frbatlanta.org/invoke.cfm?objectId=4E733776-5056-B72C-D61E3798B07E2A79&method=display> (accessed 13 December 2004).
- Cleveland, H. (2002) *Nobody in Charge: Essays on the Future of Leadership*. Jossey Bass, San Francisco, CA.
- Cohen, M.D. and L.S. Sproull (eds.) (1996) *Organizational Learning*. Sage, Thousand Oaks, CA.
- Comfort, L. (1996) *Self-organization in Disaster Response: The Great Hanshin, Japan Earthquake of January 17, 1995*. Natural Hazards Center Quick Response Report No. 78. University of Colorado, Boulder, CO.
- Comfort, L. (1999) *Shared Risk: Complex Systems in Seismic Response*. Pergamon Press, New York, NY.
- Coombs, W.T. (1999) *Ongoing Crisis Communication: Planning, managing, and responding*. Sage, Thousand Oaks, CA.
- Daniels, R.J., D.F. Kettl and H. Kunreuther (2006) *On Risk and Disaster: Lessons from Hurricane Katrina*. University of Pennsylvania Press, Philadelphia, PA.
- Detwiler, S. (2004) 'Hurricane Charley and Frances: Advice from the front lines'. *The FEPA Alert*. 10(1). <http://www.fepa.org/05winternewsletter.pdf>.
- DHS (Department of Homeland Security) (2004) *National Response Plan (NRP)*. DHS, Washington, DC.
- Drabek, T.E. (1986) *Human System Responses to Disaster*. Springer-Verlag, New York, NY.
- Drabek, T.E. (1987) *The professional emergency manager: structures and strategy for success*. Monograph No. 44. Institute of Behavioral Science, University of Colorado, Boulder, CO.
- Drabek, T.E. (2001) 'Disaster Warning and Evacuation Responses by Private Business Employees'. *Disasters*. 25(1). pp. 76–94.
- Drabek, T.E. (2003) *Strategies for Coordinating Disaster Responses*. Natural Research and Applications Information Center, University of Colorado, Boulder, CO.
- Dynes, R.R. and K.J. Tierney (eds.) (1994) *Disasters, Collective Behavior, and Social Organization*. University of Delaware Press, Newark, DE.

- Dyson, M.E. (2006) *Come to Hell or High Water: Hurricane Katrina and Color of Disaster*. Basic Books, New York, NY.
- Farazmand, A. (2001) 'Crisis and Emergency Management'. In A. Farazmand (ed.) *Handbook of Crisis and Emergency Management*. Marcel Dekker, Inc., New York, NY.
- FDEM (Florida Division of Emergency Management) (2004) *The State of Florida Comprehensive Emergency Management Plan 2004*. <http://floridadisaster.org/documents/CEMP/floridaCEMP.htm>.
- FEMA (Federal Emergency Management Agency) (2004) *Surviving the Storm: A Guide to Hurricane Preparedness*. DHS and FEMA, Washington, DC.
- Fischer, H.W., III. (1998) *Response to Disaster: Facts Versus Fiction & Its Perpetuation*. University Press of America, Inc., New York, NY.
- Fitzpatrick, P. (1999) *Natural Disasters: Hurricanes*. ABC-CLIO, Santa Barbara, CA.
- Fordham, M. (1999) 'The intersection of gender and social class in disaster: balancing resilience and vulnerability'. *International Journal of Mass Emergencies and Disasters*. 17(1). pp. 15–37.
- FSEOC (Florida State Emergency Operations Center) (2004). *State Emergency Response Team (SERT) Situation Reports*. <http://www.floridadisaster.org/eoc/archive.htm> (accessed 13 December 2004).
- Goodwin, J. (2004) *Florida Makes Use of the Web During Hurricanes*. News from the States. National Conference of State Legislatures. Fall. <http://www.ncsl.org/programs/lis/CIP/CIPCOMM/fallo4.htm> (accessed 14 December 2004).
- Haddow, G.D. and J.A. Bullock (2003) *Introduction to Emergency Management*. Butterworth Heinemann, New York, NY.
- Heath, R.L. and D.P. Millar (2004) 'A Rhetorical Approach to Crisis communication: Management, Communication Processes, and Strategic Responses'. In R.L. Heath and D.P. Millar (eds.) *Responding to Crisis: A Rhetorical Approach to Crisis Communication*. Lawrence Erlbaum Associates, Publishers, Mahwah, NJ. pp. 167–187.
- Holan, A. (2004) 'Florida Hurricanes of 2004'. *Tampa Bay Online*. <http://news.tbo.com/news/MGBKWK7No2E.html> (accessed 19 September 2005).
- Kapucu, N. (2005) 'Interorganizational Coordination in Dynamic Context: Networks in Emergency Response Management'. *Connections*. 26(2). pp. 33–48.
- Kapucu, N. (2006a) 'Public-Nonprofit Partnerships for Collective Action in Dynamic Contexts'. *Public Administration: An International Quarterly*. 84(1). pp. 205–220.
- Kapucu, N. (2006b) 'Interagency Communication Networks during Emergencies: Boundary Spanners in Multi-agency Coordination'. *American Review of Public Administration*. 36(2). pp. 207–225.
- Ketteridge A. and M. Fordham (1998) 'Flood evacuation in two Scottish communities: lessons from European research'. *International Journal of Mass Emergencies and Disasters*. 16(2). pp. 119–143.
- Kettl, D.F. (2005) *The Worst is Yet to Come: Lessons from September 11 and Hurricane Katrina*. Report 05-01. Fels Government Research Service, University of Pennsylvania, Philadelphia, PA.
- Kreps, G.A. (ed.). (1989) *Social structure and disaster: Symposium on Social Structure and Disaster*. University of Delaware Press, Newark, DE.
- McEntire, D.A. (2002) 'Coordinating multi-organizational responses to disaster: lessons from the March 28, 2000, Forth Worth Tornado'. *Disaster Prevention and Management*. 11(5). pp. 369–379.
- McEntire, D.A., C. Fuller, C.W. Johnston and R. Weber (2002) 'A Comparison of Disaster Paradigms: The Search for a Holistic Policy Guide'. *Public Administration Review*. 62(3). pp. 267–281.
- McLoughlin, D. (1985) 'A Framework for Integrated Emergency Management'. *Public Administration Review*. 45 (January). Special Issue: Emergency Management: A Challenge for Public Administration. pp. 165–172.
- Mileti, D.S. (1999) *Disasters by design: a reassessment of natural hazards in the United States*. Joseph Henry Press, Washington, DC.

- Mileti, D. and J. Sorensen (1990) *Communication of Emergency Public Warnings: A Social Science Perspective and State-of-the-Art Assessment*. Report No. ORNL-6609. Oak Ridge National Laboratory, Oak Ridge, TN.
- Mileti, D.S. and P.W. O'Brien (1992) 'Warnings during Disaster: Normalizing Communicated Risk'. *Social Problems*. 39(1). pp. 40-57.
- National Hurricane Center (2005) 'NHC/TPC Archive of Past Hurricane Seasons'. <http://www.nhc.noaa.gov/pastall.shtml> (accessed 14 December 2004).
- NCDC (National Climate Data Center) (2004) 'Climate of 2004 Atlantic Hurricane Season'. <http://www.ncdc.noaa.gov/oa/climate/research/2004/hurricanes04.html> (accessed 19 September 2005).
- Newman, J. (2004) 'Numbers tell story of season's destruction'. *Orlando Sentinel*. 29 November. p. A10.
- Nigg J. (1995) 'Risk communication and warning systems'. In T. Horlick-Jones, A. Amendola and R. Casale (eds.) *Natural Risk and Civil Protection*. E. and F.N. Spon, London. pp. 369-382.
- Otway H. and B. Wynne (1989) 'Risk communication: paradigm and paradox'. *Risk Analysis*. 9(2). pp. 141-145.
- Partnership for Public Warning (2002) *Developing A Unified All-Hazard Public Warning System: A Report by the Workshop on Effective Hazard Warnings*. Partnership for Public Warning, McLean, VA.
- Peacock, W.G., B.H. Morrow and H. Gladwin (eds.) (1997) *Hurricane Andrew: ethnicity, gender, and the sociology of disasters*. Routledge, London.
- Pellig, M. (2003) *The Vulnerability of Cities: Natural Disasters and Social Resilience*. Earthscan Publications, London.
- Perry, R.W. and M.K. Lindell (2003) 'Understanding Citizen Response to Disasters with Implications for Terrorism'. *Journal of Contingencies and Crisis Management*. 11(2). pp. 49-60.
- Pielke, R.A., Jr. and R.A. Pielke, Sr. (1997) *Hurricanes: Their Nature, and Impact on Society*. John Wiley & Sons, New York, NY.
- Points of Light Foundation (2004) *Extraordinary Need, Extraordinary Response: Volunteer Centers Responds to the 2004 Hurricanes*. Points of Lights, Washington, DC.
- Quarantelli, E.L. and R.R. Dynes (1977) *Disasters: Theory and Research*. Sage, Beverly Hills, CA.
- Schneider, S.K. (1995) *Flirting with Disaster: Public Management in Crisis Situations*. M.E. Sharpe, Armonk, NY.
- Seeger, M.W., T.L. Sellnow and R.R. Ulmer (2003) *Communication and Organizational Crisis*. Praeger, Westport, CT.
- Smart, C. and I. Vertinsky (1977) 'Designs for Crisis Decision Units'. *Administrative Science Quarterly*. 22(4). pp. 640-657.
- Swope, C. and Z. Patton (2005) 'Disaster's wake: the aftermath of Katrina and Rita'. *Governing*. November. pp. 48-58.
- Taylor, P.M. (2002) 'Perception Management and "War" against Terrorism'. *Journal of Information Warfare*. 1(3). pp. 16-29.
- Tierney, K. (2000) *Implementing a seismic computerized alert network (SCAN) for Southern California: Lessons and guidance from the literature on warning response and warning systems*. Disaster Research Center, University of Delaware, Newark, DE.
- Tierney, K.J., M.K. Lindell and R.W. Perry (2001) *Facing the Unexpected: Disaster Preparedness and Response in the United States*. Joseph Henry Press, Washington, DC.
- Tobin, G.A. and B.E. Montz (1997) *Natural Hazards: Explanation and Integration*. The Guilford Press, New York, NY.
- Trebilcock, M.J. and R.J. Daniels (2006) 'Rationales and Instruments for Government Intervention in Natural Disasters'. In R.J. Daniels, D.F. Kettl and H. Kunreuther (eds.) *On Risk and Disaster: Lessons from Hurricane Katrina*. University of Pennsylvania Press, Philadelphia, PA. pp. 89-107.

- US House of Representatives (2006) *Redirecting FEMA toward Success*. US House of Representatives, Washington, DC..
- Walter, J. and D.F. Kettl (2006) 'The Katrina Breakdown'. In R.J. Daniels, D.F. Kettl and H. Kunreuther (eds.) *On Risk and Disaster: Lessons from Hurricane Katrina*. University of Pennsylvania Press, Philadelphia, PA. pp. 255–261.
- Waugh, W.L., Jr. (1994) 'Regionalizing Emergency Management: Counties as State and Local Government'. *Public Administration Review*. 54(3). pp. 253–258.
- Waugh, W.L., Jr. (2000) *Living with hazards, dealing with disasters: an introduction to emergency management*. M.E. Sharpe, Armonk, NY.
- Waugh, W.L., Jr. (ed.) (2006) 'The Political Costs of Failure in the Katrina and Rita Disasters'. In W.L. Waugh, Jr. (ed.) 'Shelter from the Storm: Repairing the National Emergency management System after Hurricane Katrina'. *The Annals of the American Academy of Political and Social Science*. 604 (March). Special Issue. pp. 10–25.
- Weaver, T. (2004) 'Proof is in the Pudding: Florida CERT makes a difference in four hurricanes'. *The Connection*. 7(1). <http://www.naem.com/connection/11/fl1.html>.
- Weick, K.E. (1993) 'The Collapse of sensemaking in organizations: The Mann Gulch disaster'. *Administrative Science Quarterly*. 38(4). pp. 628–652.
- Weick, K.E. (1995) *Sensemaking in Organizations*. Sage, Thousand Oaks, CA.
- Weick, K. and K. Roberts (1993) 'Collective mind in organizations: Heedful interrelating on flight decks'. *Administrative Science Quarterly*. 38(3). pp. 357–381.
- Weick K.E. and K.M. Sutcliffe (2001) *Managing the Unexpected: assuring high performance in an age of complexity*. Jossey Bass Publishers, San Francisco, CA.
- White, G.F. and J.E. Haas (1975) *Assessment of Research on Natural Hazards*. MIT Press, Cambridge, MA.
- Williams, D.E. and B.A. Olaniran (1998) 'Expanding the crisis planning function: Introducing elements of risk communication to crisis communication practice'. *Public Relations Review*. 24(3). pp. 387–400.
- Wood, R.S. (2004) 'Earthquake Entrepreneurs: Local Policy Systems and the Regulation of Public Risks in California'. *State and Local Government Review*. 36(3). pp. 198–211.