

## Chapter 5

---

# The Role of Coordination in Disaster Management

---

Ross Prizzia

### CONTENTS

Coordination and Disaster Preparedness .....	76
Problems of Coordination .....	78
Terrorist Attacks on the World Trade Center .....	78
Problems of Coordination in Response to Katrina .....	80
Coordination and Organizational Theory.....	81
Coordination and Technology .....	82
Strategic Emergency Planning and Coordination .....	84
FEMA and Federal Multiagency Coordination .....	84
Primary Federal Agencies .....	85
Plans to Improve Coordination .....	86
FEMA Reengineering for Catastrophe Readiness and Response.....	87
Disaster Management in the State of Hawaii .....	88
Coordination of Public and Private Sector Organizations.....	88
Survey of Emergency Managers on Role of Coordination .....	90
Results of the 2005 Survey.....	91
Adequacy of Coordination .....	91

Improving Coordination .....	92
Improving Coordination with the Private Sector.....	93
Improving Coordination with the Media .....	94
Conclusion .....	95
Summary and Recommendation .....	95
References .....	96

## Coordination and Disaster Preparedness

Coordination and collaboration in disaster management among public and private sector agencies and organizations at the community, city, local, state, national, and even international levels have become increasingly urgent. Technological advances of early warning systems and the continuous improvement of these systems have facilitated and supported agency coordination in the management of man-made and natural disasters in the State of Hawaii (HGICC, 2006). Disaster preparedness requires an understanding of various hazards, planning, coordination, an investment in continuous training involving national standards, and leadership that supports collaboration at all levels of the existing decentralized system of governance (Bentley and Waugh, 2005; Cigler, 2006).

On September 11, 1992, when the eye of Hurricane Iniki passed directly over the island of Kauai as a Category 4 hurricane, emergency managers of the State of Hawaii experienced their version of a 9/11 attack by mother nature. Iniki remains the most powerful hurricane to strike the State of Hawaii in recorded history, causing \$1.8 billion in damage. However, coordination among emergency managers at the local level in Kauai and Oahu counties as well as at the state and federal levels of government prior to, during, and after Iniki minimized the number of deaths to a total of six. This stands in stark contrast to the number of casualties of Hurricane Katrina in 2005. The Central Pacific Hurricane Center (CPHC) issued tropical cyclone warnings and watches for the hurricane well in advance, and accurate forecasts allowed for wide-scale evacuations. A hurricane watch was issued for Kauai early on September 9 and was upgraded to a hurricane warning later that day (CPHC, 1992). Prior to Iniki's arrival in Kauai, 8000 people were housed in shelters, many of who remembered Hurricane Iwa in 1982. Rather than sending tourists to public shelters, two major hotels kept their occupants in the buildings during the storm's passage. During the evacuation of the island, people left days before to either family, friends, or to shelters. Because schools were canceled, traffic was light and evacuation was well executed (USACE, 1993). Among those on Kauai was filmmaker Steven Spielberg, who was preparing for the final day of shooting of the movie *Jurassic Park*. He and his 130 cast and crew remained safely in a hotel during Iniki's passage (Kamen, 1992). Roughly one-third of Oahu's population participated in the evacuation to public shelters, while many others went to a family or friend's house for shelter. The evacuations went smoothly, beginning with the

vulnerable coastal areas. For those in need, vans and buses provided emergency transportation, while police directed traffic in certain overused intersections. The two main problems during the evacuation were lack of parking at shelters and inadequate exit routes for the coastlines (Kamen, 1992).

Immediately after the storm in Kauai, many were relieved to have survived the worst of the Category 4 hurricane. However, relief soon turned to apprehension due to lack of information, as every radio station was out and there was no news available for several days. Using food from battery powered refrigerators and freezers, communities held lavish parties to cope with the situation. Though food markets allowed those affected to take what they needed, many Kauai citizens insisted on paying. Because the hurricane destroyed much of their belongings, many groups gathered for video parties powered by portable generators. In addition, entertainers from all over Hawaii, including the Honolulu Symphony, provided free concerts to the victims (Sommer, 2002). Although looting occurred in the aftermath of Iniki, it was minor. A group of Army Corps of Engineers, who experienced the looting after Hurricane Andrew just weeks prior to Iniki, were surprised at the overall calmness and lack of violence on the island.

Kauai citizens remained hopeful for compensatory monetary aid from the government or insurance companies (Sommer, 2002), while the military effectively provided aid for their immediate needs, even before local officials requested aid (Peach, 1993). However, in the months after the storm, many insurance companies left Hawaii. In response, State Governor John D. Waihee III enacted the Hurricane Relief Fund in 1993 to help unprotected Hawaiians. The fund was never needed for another Hawaii hurricane, and it was terminated in 2000 when insurance companies returned to the islands (Harris, 2001).

In contrast to Iniki, when Hurricane Katrina ravaged Louisiana and Texas in 2005, it exposed a failure of policy and leadership at the federal level which paralyzed managerial and administrative capacity at the local level, resulting in a lack of coordination and an effective command system (Cigler, 2006; Farazmand, 2005). Katrina was one of the worst natural disasters in U.S. history. The storm killed more than 1200 people in Louisiana, Mississippi, and Alabama, left hundreds of thousands homeless, and caused tens of billions of dollars in damage. The government's inadequate response to this disaster spawned several studies and even a special hearing of the U.S. Senate Homeland Security and Governmental Affairs Committee (Jansen, 2006). One post-Katrina study, "Political Appointments, Bureau Chiefs and Federal Management Performance," suggests that government executives are better managers in time of crisis in general than politically appointed bureau chiefs (Lewis, 2005). The study finds that politically appointed bureau chiefs get systematically lower management grades than bureau chiefs drawn from the civil service. Findings indicate that programs administered by appointed managers get grades five-to-six points lower than those administered by careerists even when controlling for differences among programs, substantial variation in management environment, and the policy content of programs themselves (Lewis, 2005).

The study further reveals that career managers have more direct bureau experience and longer tenures and these characteristics are significantly related to management performance. Apparently, although political appointees have higher education levels, more private or nonprofit management experience, and more varied work experience than careerists, these characteristics are uncorrelated with management performance (Lewis, 2005). Lewis therefore concludes that some combination of structural changes to reduce the number of appointees or increased sensitivity to appointee selection based upon certain background characteristics could improve federal bureau management (Lewis, 2005).

## ***Problems of Coordination***

### *Terrorist Attacks on the World Trade Center*

Coordination became of critical importance to disaster management in the wake of the attacks on the World Trade Center on September 11, 2001. It is recognized that coordination is essential not just for detecting and preventing terrorist attacks, but also for ensuring an effective local response to terrorist events. When terrorist-related events occur, coordination is critical among police officers, firefighters, emergency medical technicians, public health workers, and other similar emergency personnel. Terrorist attacks, like the ones on the World Trade Center and the Pentagon, require extraordinary levels of coordination. Such catastrophes are not simply fires, crime scenes, or emergencies with injured people, and they can happen instantaneously all at once overwhelming the ability of any agency or jurisdiction to respond. Therefore, the effectiveness of a community's response to a terrorist attack is dependent upon coordination among first responders and their ability to implement response plans.

The attacks on the World Trade Center created overwhelming coordination problems. Emergency supervisors in the lobbies of the two towers lacked reliable information about what was happening above them or outside the buildings. Television viewers around the country had better information on the spread of the fires than the lobby emergency supervisors, who had no access to the television broadcasts. Moreover, radio communications were sporadic throughout the towers. First responders raced into burning buildings without regard for their own safety, but the scale of the New York attacks overwhelmed the system. A New York City Police Department (NYPD) helicopter circled overhead, but the fire chiefs had no link to the police information. There were no senior NYPD personnel at the fire department's command posts—and vice versa. Further, the New York City Fire Department (FDNY) lacked an established process for securing mutual aid from surrounding communities. Nassau and Westchester counties supplied ad hoc assistance, but the FDNY had no procedure for integrating the reinforcements into its own effort. With half of the FDNY force at the World Trade Center, and with no established mutual aid agreement with neighboring communities, the rest of the city

lacked adequate protection. Moreover, coordination problems within and between the NYPD and FDNY were compounded by bureaucratic competition, especially among those in the intelligence community whose responsibility was to interpret conflicting reports on the hijackers' activities (Kertl, 2003).

In an attempt to address some of the problems of coordination exposed in response to the World Trade Center disaster, many emergency planners recommend that local officials should follow an "all risk" strategy that involves building a strong, basic capacity for local emergency response and deploying that capacity to respond to natural and man-made disasters including terrorism (FEMA, 2003). This recommendation is especially poignant because most cities cannot afford to create a special team devoted solely to terrorism. The FDNY discovered during 9/11 that responding to a building collapse requires the same fundamental techniques regardless of the cause. Effective response to terrorism depends on an effective first-response system that can handle a wide range of emergencies. The catastrophic destruction of the terrorists' attacks on September 11 revealed that even the best trained and equipped first responders can find themselves overwhelmed.

In response to disasters, local governments typically rely on mutual aid agreements with neighboring communities under which reinforcements can be brought in quickly. Because of its size, the FDNY had no formal mutual aid agreements with surrounding jurisdictions. Such agreements are often difficult to achieve because of the dilemma of smaller communities not wanting to join larger communities in a regional approach, thus sacrificing their right to separate funding, whereas larger communities are not willing to guarantee that they would respond to problems in smaller towns for fear that serious events would overwhelm their own capacities (Robinson et al., 2003).

A 2003 Council on Foreign Relations (CFR) study found that two years after September 11 "the United States remains dangerously ill prepared to handle a catastrophic attack on American soil" (Rudman et al., 2003). The council found that fire departments often could supply radios to just half of the firefighters on a shift and that only 10 percent of the nation's fire departments had the personnel and equipment to rescue people trapped in a building collapse. Police departments lacked the gear to protect their officers following an attack with weapons of mass destruction, and most states did not have adequate equipment, expertise, or capacity to test for biological or chemical attacks. The CFR study noted that "America's local emergency responders will always be the first to confront a terrorist incident and will play the central role to deal with the immediate consequences," and concluded that the first responders were "drastically under funded" and "dangerously unprepared" (Rudman et al., 2003). Under close examination, even the best prepared communities showed dangerous gaps in equipment and training. First responders everywhere discovered that the coordination with neighboring communities was often inadequate. Some of the problems were technical, like radios with different frequencies. Other problems were political and bureaucratic, as was the case at the federal and local levels, where individual departments and local governments struggle

to maintain their autonomy. The problems of coordination exposed deficiencies in readiness and response to the terrorist man-made disasters of September 11, 2001. Unfortunately, the lessons learned from this experience did not translate into an improved capability in response to the natural disaster, Hurricane Katrina, in August 2005.

### *Problems of Coordination in Response to Katrina*

Hurricane Katrina was a natural disaster that overwhelmed the existing capability of the federal, state, and local response system and became a regional catastrophe. This was rather surprising because emergency planning had taken place after the man-made disaster on September 11 and the natural disaster caused by Hurricane Pam in Louisiana in July 2004. In coordination with state, local, and community-based emergency managers, the Department of Homeland Security (DHS) and Federal Emergency Management Agency (FEMA) collaborated and developed a number of strategic planning initiatives to support an “all hazards approach” in the preparation for and response to disasters. Critical assessments were made and kept up-to-date of the real and potential response capability of the federal, state, and local disaster response systems. The assessments include but are not limited to the following (Wells, 2006):

- Magnitude of the disaster
- Situational awareness on the part of designated emergency managers and affected citizens
- Continuity of government operations
- Mass evacuation operations and potential use of hotels and cruise ships as shelters
- Security issues

Apparently, the assessments of response capability and the ability to implement the new all hazards initiatives of disaster readiness and response systems failed when put to the test by a disaster of Katrina’s catastrophic proportions. There were major problems of coordination with the communications, security, evacuation, and supply systems in response to Katrina that eventually led to a collapse in the command system and widespread chaos and loss of life. According to one FEMA, federal coordination officer who was on the scene and part of the response effort to Katrina, the major problems included the following (Wells, 2006):

- Inadequate existing emergency management systems to cope with catastrophic disasters
- Limited capability at the state and local levels of government in terms of equipment, supplies, and distribution system
- Inadequately trained, staffed, and equipped federal response teams

- Leadership and emergency managers with little or no emergency management training or experience with limited decision-making skills in time of crisis
- Inadequate competent financial management before, during, and after the disaster

Critical to the effective response capability was the coordination of the federal and other response teams. However, many team members were meeting for the first time and never trained together prior to the disaster. Moreover, for many of the team members their participation as an emergency responder was not their primary job function, but rather a temporary, part-time, secondary responsibility. Moreover, many of the upper and mid-level emergency managers designated to network with and assist in coordinating the deployment of rapid response teams remained in their offices in Washington, DC and other locations remote from the scene of the disaster. This resulted in the response teams functioning more like a loosely organized group rather than a well-trained rapid response team (Wells, 2006). Even where teams did coordinate effectively, because their response training focused more on the symptomatic lessons learned from the last disaster (i.e., Hurricane Pam), their disaster readiness capability was inadequate to address the fundamental problems and new challenges of Katrina (Wells, 2006).

### ***Coordination and Organizational Theory***

Coordination within the Department of Homeland Security (DHS) with 22 agencies proved to be very difficult, especially in determining which agencies should be linked and how. Because homeland security includes many different agencies performing many different functions, drawing clear lines of responsibility is difficult. Figuring out how to make all the agencies work together is even more difficult. As journalist Sydney J. Freedberg Jr. observed, “The US government was just not designed with terrorists in mind” (CBS NEWS, 2002). Effective homeland security requires tailoring coordination to the special nature of homeland security problems, and each incident requires a response tailored to the special needs it presents (Kerzl, 2003).

Political leaders and theorists have traditionally relied on organizational structure to solve coordination problems. For theorists like Gulick, “wherever many men are thus working together the best results are secured when there is a division of work among these men. The theory of organization, therefore, has to do with the structure of coordination imposed upon the work-division units of an enterprise” (Gulick, 1937). Accomplishing difficult jobs requires the division of labor among workers and that organization requires effort at establishing coordination. Gulick emphasized only four ways of organizing: according to purpose or function, process (or the way things are done), clientele (the individuals served), or place (the location being served). Organizational leaders must choose one of the four and none of the

choices is ideal, with each having advantages and disadvantages. Leaders must make the necessary choice of one alternative, with the knowledge that the choice brings clear benefits and certain costs.

Gulick concluded that organization by purpose or function was most often the best choice because “purpose is understandable by the entire personnel down to the last clerk and inspector” (Gulick, 1937). Organizing by function also was emphasized by Frederick W. Taylor in his pursuit of scientific management and his focus on division of labor (Taylor, 1911). When organizations had a difficult time finding highly skilled people to accomplish difficult jobs, Taylor’s response was to redesign the job through “job simplification,” focus on a narrow set of skills, separate the job into each of these skills, and increase the number of workers. Thereafter, each worker was directed to perform one skill in a mechanized sequence. This process eventually evolved into the assembly line of production in the private sector.

However, because it is usually difficult to divide work neatly, organization by function involves fundamental problems that can create gaps, service problems, and inefficiencies. Organization by function also tends to strengthen top-down managers, whose job is to define functions and allocate responsibilities. Christopher Hood pointed out that when disasters occur, a common response is to suggest that “the problem (whatever it was) could have been averted if only there had been more coordination, better procedures, more planning and foresight, clearer assignment of authority, more general ‘grip’ on the part of experts, professionals, or managers.” The typical solution is “to tighten up the rules and authority structures to prevent a recurrence” (Hood, 1998). However, coordination is often a “problem of contingency, and what works best depend on the problem to be solved” and existing structures are rarely able to adapt easily and quickly enough to many of the most difficult problems presented by man-made and natural disasters (Kettl, 2003b). First responders and officials could better be able to adapt to the unpredictability of a specific emergency and address problems common to coordination during disasters if there were more nonstructural approaches, including interorganizational networks (such as mutual aid agreements), improved information technology, and stronger political leadership (Kettl, 2003b). Moreover, process theories of motivation, and other nonstructural, process-oriented approaches such as total quality management (TQM), and “best practices” may prove to be more relevant and applicable in addressing the problems of coordination in disaster management.

### ***Coordination and Technology***

The problems that emerged in the response to September 11 reinforced Herbert Simon’s argument about the need for contingent coordination, especially when dependent on technology (Simon, 1947). For example, when New York City divided its public protection operations along the traditional functional lines of



police and fire, the fire department did not want to adopt the police department's communication standards, and vice versa, which rendered the implementation of new coordination systems inoperable (Kettl, 2003a). The computerized management system was so centralized and secured that when the World Trade Center buildings collapsed, they also destroyed the operations grid that told fire commanders which crews were working in which building, and on what locations, and it took hours to determine who was missing and where they might be found. The fire and police commanders did not exchange information, nor did they have the ability to coordinate their operations, so warnings from the police helicopter overhead never reached the fire commanders (Kettl, 2003a). In contrast, the Arlington County fire and police commanders developed coordination mechanisms that reconciled potential gaps and their response to the attack on the Pentagon represented the implementation of pretested coordination plans (Kettl, 2003a).

Even when local first responders could hold their own against the dangers they faced most often, they were under-equipped for responding to terrorist events. The RAND Corporation found, "The majority of emergency responders feel vastly under prepared and under protected for the consequences of chemical, biological, or radiological terrorist attacks." The problem was partly technical and partly simple uncertainty. "Emergency workers felt they did not know what they needed to protect against, what protection was appropriate and where to look for it" (RAND, 2003). Firefighters needed equipment that was lighter and easier to work with. Police officers needed better body-armor and improved dashboard computers. All of the first responders needed better monitors to detect chemical, biological, or radiological hazards (Kettl, 2003a). Everyone wanted better equipment, but local departments also needed better training and improved coordination. Some of the coordination problems were also technological. In New York, fire commanders often could not communicate with their teams because the concrete and steel in high-rise buildings blocked their radios. Firefighters often had little or no communications with police commanders. On the morning of September 11, the NYPD had helicopters circling the burning towers, but fire commanders received no reports from them on the condition of the burning buildings (Kettl, 2003a). People watching the burning buildings on television had more information than did the fire commanders. In many communities around the country, police, fire, and emergency medical technicians use different radio frequencies and cannot communicate at the scene of a disaster. Emergency workers in one jurisdiction often have found it difficult or impossible to communicate with first responders in neighboring jurisdictions, or with officials at the state or the federal level (Kettl, 2003a).

Texas established three frequencies for local first responders to use to request aid. The Texas Forest Service supplied fire departments with vehicles and ensured that each could receive at least one of these three frequencies. However, larger jurisdictions were not part of the program, nor were other first responders such as police officers and emergency medical technicians. After carefully examining the program,

one team of analysts concluded that “the puzzle of communication interoperability appears to be almost insurmountable” (Jansen, 2006).

In an attempt to address the problem of interoperability, simulations are routinely conducted by the federal government to build effective networks for coordination. For example, in May 2003, the Department of Homeland Security (DHS) conducted a major exercise to test the system’s response to a simulated dirty bomb detonation in Seattle and the pneumonic plague in Chicago. The exercise, named TOPOFF, for the “top officials” who were involved as key players, revealed serious coordination problems, especially in communication between federal and local officials, including the inability of local officials to get the medical equipment they needed because no one knew which federal agency was responsible (Block, 2003).

## **Strategic Emergency Planning and Coordination**

### ***FEMA and Federal Multiagency Coordination***

In promoting effective planning, partnerships, and preparation, FEMA has to work with federal, state, and local agencies. Each level of government requires a different strategy. Through the use of legislation, Presidential Decision Directives, and directives from the executive branch of government, to some degree federal inter-agency planning, partnership, and preparation can be facilitated. However, in dealing with sovereign states, FEMA must often rely on voluntary cooperation and mutual aid agreements to promote planning, partnerships, and preparation (Prizzia and Helfand, 2006).

The U.S. Government interagency Domestic Terrorism Concept of Operations Plan (CONPLAN) represents a concerted effort by a number of federal departments and agencies to work together to achieve a common goal. The CONPLAN was developed through the efforts of six primary departments and agencies with responsibilities as identified in President Decision Directive/NSC-39 (PDD-39). This plan was developed consistent with relevant PDDs, federal law, the Attorney General’s Critical Incident Response Plan, the PDD-39 Domestic Guidelines, and the Federal Response Plan and its Terrorism Incident Annex. The FBI has worked with the six departments and agencies to provide a forum to participate in planning and executing activities to develop, maintain, and enhance the federal response capability.

The CONPLAN is intended to provide overall guidance to federal, state, and local agencies concerning how the federal government would respond to a potential or actual terrorist threat or incident that occurs in the United States, particularly one involving weapons of mass destruction (WMD). The CONPLAN outlines an organized and unified capability for a timely, coordinated response by federal agencies to a terrorist threat or act. It establishes conceptual guidance for assessing

and monitoring a developing threat; notifying appropriate federal, state, and local agencies of the nature of the threat; and deploying the requisite advisory and technical resources to assist the lead federal agency (LFA) in facilitating interdepartmental coordination of crisis and consequence management activities (Prizzia and Helfand, 2006).

The actions each agency or department must perform during each phase of the response include crisis management and consequence management actions that are necessary to control and contain chemical, biological, nuclear/radiological, and conventional materials or devices. Prescribed actions will continue to be refined to better clarify the mission, capabilities, and resources of supporting departments and agencies.

The CONPLAN establishes local agencies and defines their responsibilities. The departments and agencies listed below agreed to support the overall concept of operations of the CONPLAN to carry out their assigned responsibilities under PDD-39 and PDD-62. The departments and agencies also agreed to implement national and regional planning efforts and to conduct appropriate activities to maintain the overall federal response capability.

### ***Primary Federal Agencies***

The response to a terrorist threat or incident within the United States will entail a highly coordinated, multiagency local, state, and federal response. In support of this mission, the following primary federal agencies will provide the core federal response:

- Department of Justice (DOJ)/Federal Bureau of Investigation (FBI)
- Federal Emergency Management Agency (FEMA)
- Department of Defense (DOD)
- Department of Energy (DOE)
- Environmental Protection Agency (EPA)
- Department of Health and Human Services (DHHS)

The Department of Justice and the Federal Bureau of Investigation will be the lead agencies for crisis management. The Federal Emergency Management Agency has been designated as the lead agency for consequence management.

Although not formally designated under the CONPLAN, other federal departments and agencies may have authorities, resources, capabilities, or expertise required to support response operations. Agencies may be requested to participate in federal planning and response operations, and may be asked to designate staff to function as liaison officers and provide other support to the LFA (Prizzia and Helfand, 2006). The CONPLAN defines the responsibilities of the various federal agencies in the event of a terrorist attack.

## ***Plans to Improve Coordination***

In March of 2006, Homeland Security Secretary Michael Chertoff announced several new measures designed to strengthen the FEMA's essential functions so it can more effectively respond to manmade or natural disasters, particularly during catastrophic events. These new measures are designed to match the experience and skills of FEMA employees with twenty-first century tools and technology, maximizing the agency's performance regardless of disaster size or complexity. However, it should be noted that in April 2005 the U.S. Senate Homeland Security and Governmental Affairs Committee proposed that FEMA, which floundered in the wake of Hurricane Katrina, should be abolished and replaced with a new organization better equipped to respond to disasters (Jansen, 2006). While acknowledging "significant failures" in how he and FEMA handled the storm, Secretary Michael Chertoff assured the committee that he made changes to ensure that the government would not be caught off guard by the next hurricane. Those changes include the creation of the rapid response teams that can be deployed quickly to threatened regions and better communications (Jansen, 2006).

The DHS fiscal year 2007 budget request asks for increased funding to begin strengthening FEMA—specifically a 10 percent increase in FEMA's budget over this fiscal year. In total, funding for FEMA's core budget will grow 40 percent since fiscal year 2004. This budget request also provides additional resources to update FEMA's Emergency Alert System, increase FEMA's procurement staff and overall capabilities, improve capital infrastructure and information technology; and strengthen overall mitigation, response, and recovery capabilities.

Together, these new measures and additional resources are intended to improve DHS's ability to build integrated homeland security capabilities, eliminate unnecessary bureaucracy, serve disaster victims more effectively, and empower FEMA to act with efficiency and urgency when fulfilling its historic and critical mission of response and recovery particularly before the next hurricane season (PA Times, 2006).

Other changes instituted to improve coordination include the following:

- Improve coordination and efficiency of operations. A new director of operations coordination will enable DHS to more effectively conduct joint operations across all organizational elements; coordinate incident management activities, and utilize all resources (PA Times, 2005).
- Enhance coordination and deployment of preparedness assets. The Information Analysis and Infrastructure Protection Directorate will be renamed the Directorate for Preparedness and consolidate preparedness assets from across the department. The Directorate for Preparedness will facilitate grants and oversee nationwide preparedness efforts supporting first responder training, citizen

awareness, public health, infrastructure and cyber security, and ensure proper steps are taken to protect high-risk targets. The directorate will be managed by an undersecretary and include

1. A new assistant secretary for cyber security and telecommunications, responsible for identifying and assessing the vulnerability of critical telecommunications infrastructure and assets; providing timely, actionable, and valuable threat information; and leading the national response to cyber and telecommunications attacks.
2. A new chief medical officer, responsible for carrying out the department's responsibilities to coordinate the response to biological attacks, and to serve as a principal liaison between DHS and the Department of Health and Human Services 2001, the Centers for Disease Control, the National Institutes of Health, and other key parts of the biomedical and public health communities:
  - Assistant Secretary for Infrastructure Protection
  - The Office of State and Local Government Coordination and Preparedness responsible for grants, training, and exercises
  - U.S. Fire Administration
  - Office of National Capital Region Coordination.

### *FEMA Reengineering for Catastrophe Readiness and Response*

FEMA began several initiatives to improve coordination after Katrina exposed problems of coordination of readiness and response in communications, evacuation, and understanding of the national response plan and relevant state and local response plans. Prominent among these initiatives is the FEMA reengineering for catastrophe readiness and response initiative that includes but is not limited to the following (Shea, 2006):

- Develop and implement advanced logistics and supply tracking system similar to that of the private sector.
- Improve communications by training and deploying five-person “communication teams.”
- FEMA collaboration with state and local governments to identify wide gaps in the existing response capability and to establish effective methods to close these gaps.
- FEMA/DHS collaboration to address legal and social issues to improve evacuation plans by improving the relationship with Red Cross in the effective use of volunteers before, during, and after evacuations.
- Improve understanding of National Response Plan among all emergency managers and responders at all levels of governments including the private sector and community-based volunteers.

## **Disaster Management in the State of Hawaii**

The primary government agency for disaster response is the Oahu Civil Defense Agency (OCDA), a department in the city and county of Honolulu. The mayor acts as the CEO of OCDA and has the power to declare a disaster. Disasters are county specific. Each county (i.e., Honolulu, Maui, Kauai, and Hawaii) individually determines what constitutes a disaster. For example, the island of Hawaii may have volcanic eruptions listed as natural disasters, whereas Honolulu would not. Disasters can also be localized to certain areas within a county and designated to the Local Emergency Planning Committee (LEPC), which is part of the city and county of Honolulu, as opposed to the State's Emergency Response Commission, which oversees the Hawaii State Civil Defense System. The state's primary responsibility is to provide leadership in rapid assistance during a disaster, with a full range of resources and effective partnerships. To strengthen its leadership role, the State of Hawaii hosted leaders from the public and private sectors to meet and develop innovative response strategies at the Inaugural Asia-Pacific Homeland Security Summit in Honolulu in November 2003 (Mangum, 2003).

All city departments follow the directive outlined in the city and county of Honolulu's Emergency Operations Plan (EOP). Once the EOP draft is approved by the mayor and city council, all county departments and coordinating county agencies follow suit accordingly.

Most of Oahu's medical centers play a crucial role in disaster preparedness and response (Griffith and Oshiro, 1999). In particular, Queen's Medical Center (QMC) with its 560 beds is the largest and oldest hospital and main trauma center in Hawaii. QMC is instrumental in the coordination of disaster response and it plays an active role in Honolulu's Disaster Committee (Prizzia, 2004).

### ***Coordination of Public and Private Sector Organizations***

It has been proposed that emergency management is both proactive and reactive. This realization applies to QMC in its efforts to coordinate with outside agencies (Sensenig, 1999). The primary means by which QMC achieves its coordination is through the Healthcare Association of Hawaii (HAH).

The HAH is a nonprofit organization representing the State of Hawaii's acute care hospitals and two-thirds of the long-term care beds with a total of 41 facilities. HAH also represents community-based providers and many supporting organizations that provide services and supplies to the healthcare industry. This includes the HAH Emergency Preparedness Committee (EPC), which is responsible for providing hospital services in support of the state civil defense system as cited in Hawaii's Disaster Relief Act (Hawaii Revised Statutes, Chapter 127) and various federal, state, and county emergency response plans. The chair of the EPC is appointed by the chief executive officer (CEO) of HAH. Members are appointed by the CEO of their respective healthcare organization. EPC coordinated Island Crisis, a full-scale chemical terrorism response drill in May 1999 in which fourteen hospitals

participated and five of these facilities demonstrated their ability to provide emergency casualty decontamination.

The Honolulu-based EPC is unique in the nation. Its strength is the ability to bring key stakeholders involved in healthcare emergency response into one well-aligned and well-coordinated system. Improvement opportunities include the need to further incorporate nonhospital organizations into the network more effectively and to provide ongoing professional development of hospital emergency coordinators. According to former Vice President of Kaiser Permanente Medical Center, Toby Clairmont, who has worked over 250 emergencies in the last 25 years ranging from multifamily structural fires to hurricanes, three critical factors in successfully responding to emergencies are

- Family emergency preparedness
- Local community emergency response teams
- Well-trained organizational coordinators

HAH includes among its affiliate members other organizations that support coordination in emergency response efforts, such as Hawaii Air Ambulance and International Life Support, Inc. Moreover, a Web site was developed by the Emergency Preparedness Program (EPP) of the HAH. It is designed to provide information and data management services to healthcare facility emergency managers of organizations such as the American Red Cross, Hawaii State Civil Defense, OCDA, and hotels that are also members of Honolulu's disaster committee at the city and county of Honolulu's EOC. This coordination extends to the neighboring islands. For example, in June 2001, the West Hawaii branch of the American Red Cross provided disaster response training to community-based volunteers in Kona.

Other organizations in the network are Kaiser Medical Center, Kuakini Medical Center, St. Francis Medical Center, Queen's Medical Center, Tripler Army Medical Center, and Blood Bank of Hawaii. The Blood Bank of Hawaii plays a vital role and designates 10 percent of all donated blood to disaster victims suffering from trauma.

The OCDA facilitates agency coordination through communication, training, procedures, and information within the city and county of Honolulu. OCDA also coordinates disaster responsibilities among various private organizations and educates the public about emergency preparedness. Interviews with OCDA personnel revealed that they are continuously reviewing, revising, and testing procedures outlined in the EOP. The administrator of the OCDA works closely with the mayor and acts as an advisor for disaster preparedness and emergency management. OCDA also has hundreds of volunteers.

The EOC is designed to facilitate agency coordination emergency response including establishing operational policy, providing logistical and resource support, and communications. Specifically, the EOC houses the communications system for the Emergency Broadcast System and a meeting place for the city and county of

Honolulu's Disaster Committee. During a real disaster or training exercise, the city and county of Honolulu's Disaster Committee gathers on a rectangular table equipped with a telephone for each seat. The mayor sits on one end of the table and the OCDA administrator on the other. Other representatives from various city and county of Honolulu departments occupy the rest of the table (e.g., fire, police, public works, etc.). The EOC also houses the communications and radio devices for emergency medical services (EMS), hospitals, police, fire, utility companies, and federal, state, and other county agencies.

Advanced warning systems located at disaster and research centers in Hawaii also aid agency coordination in response to a wide range of natural disasters that threaten Hawaii and the Pacific region. The Pacific Tsunami Warning Center (PTWC) was established in 1949 in Ewa Beach, Hawaii, to provide advance warnings of likely tsunamis to most countries in the Pacific Basin. It is continually upgraded with the most sophisticated technology, including access to NASA's Earth Observing System (EOS) data. The PTWC also plays a crucial role in agency coordination in disaster response in Hawaii and throughout the Pacific. The PTWC monitors a real-time reporting deep-ocean system that communicates with weather resistance surface buoys that surround the Hawaiian Islands, and are sensitive enough to detect tsunami vibrations throughout the Pacific (EOSDIS, 2005).

The Pacific Disaster Center (PDC) located in Kihei on the island of Maui in Hawaii enhances agency coordination by assisting emergency managers to network in Hawaii and throughout the Pacific region to make informed decisions in times of crisis (Shirkhodai, 2003). The Research Corporation of the University of Hawaii (RCUH) in coordination with the PDC, Hawaii State Civil Defense, Pacific Command for DOD, FEMA, and other disaster organizations has begun development for the automatic production of cloud-free base images using full-resolution Landsat 7 data. This advance technology and Landsat 7 data will enable users at remote sites to evaluate the quality and coverage of images using browse data prior to ordering the full resolution scenes. This technology will also enable disaster managers to obtain an essentially cloud-free high resolution satellite image of their geographic area of interest. The image will be generated on demand using the most recent data available for the area, which extends over much of the Pacific and Indian Oceans (Mouginis-Mark, 2005).

## **Survey of Emergency Managers on Role of Coordination**

The role of the coordination in emergency management in Hawaii is of special importance. The impact of coordination on emergency management is a topic of great concern during all phases of a disaster, but is particularly critical during the final phase of disaster preparedness and the initial phase of disaster response. Coordination helps emergency managers to prepare and respond to disasters,



especially in the immediate post-impact stage of a disaster. To obtain firsthand data on the role of coordination during the critical phase of final disaster preparedness and initial disaster response, a sample of 50 emergency managers which represents about 20 percent of the emergency managers in the State of Hawaii with ten years or more of emergency management experience was surveyed during the months of November and December of 2005. The emergency managers were contacted by e-mail and telephone and asked the following questions.

- Do you feel coordination among community, local, county, state, and federal agencies is adequate to meet the challenge of a major natural and man-made disaster? How might coordination be improved?
- In your opinion, how can coordination with the private sector be improved to assist your efforts before, during, and after a major natural or man-made disaster?
- In your opinion, how best could you utilize the media to assist in coordinating your efforts before, during, and after a major natural or man-made disaster?

## ***Results of the 2005 Survey***

### ***Adequacy of Coordination***

In response to the question about the adequacy of coordination among community, local, county, state, and federal agencies to meet the challenge of major natural and man-made disasters, over 90 percent of the Hawaii emergency managers responded that they were adequately prepared. The main reasons given by respondents for the adequacy of coordination in Hawaii included the following:

- The emergency management community regularly conducts exercises together. They work together and participate in coordinated planning and operations meetings.
- County, state, and federal agencies in Hawaii are working together to address the issue of coordination to achieve the goal of interoperability.
- The Honolulu Police Department (HPD) through the DHS, State Civil Defense as well as CERT conducts training regularly with other agencies including personnel with military-based unified and incident commands.
- The Hawaii Fire Department (HFD), HPD, EMS, and Ocean Safety have adopted UHF radios that allow interagency communication. The new system eliminates the past problems of different radio frequencies and related deficiencies highlighted in the 9/11 disaster by providing for quality, short range, line of sight communications and are far superior in convoy situations than CB radios.
- The established network among the HPD, military, U.S. Coast Guard, EMS, and FEMA, National Guard Units, and DOD Affiliations functions extremely well with an excellent working relationship.

- Many civilian emergency personnel working for public agencies at the state and local levels also serve in some capacity in military National Guard or reserve units so there are great opportunities to share ideas.
- Emergency personnel at the state and local levels are well trained and train annually in all types of hazards.

Some emergency managers expressed that they believed that disaster coordination in Hawaii is the best in the nation and noted that “many emergency preparedness instructors on the mainland commented on the excellent networking within the state of Hawaii.” Another emergency manager noted that “Whenever I travel to the mainland for training or conferences it never ceases to amaze me how far ahead are we in terms of internal and external coordination and communication. We are lucky that our county boundaries are separated by water and this fact has eliminated the problems that many communities face in regards to turf battles and county jurisdiction.”

### *Improving Coordination*

In response to the question as to how coordination might be improved, 93 percent of emergency managers responded that training is the most important means to improve coordination. All aspects of training were cited by emergency managers including increased frequency, increased funding for replacement emergency personnel while those in place are in training, and more “hands-on” training. Typical responses on improving coordination among emergency managers included the following:

- Coordination is currently adequate. However, if like in the World Trade Center disaster, the community loses its leaders; other people will need to rise to the occasion to coordinate. To improve, ensure lower level managers know the system and can take command.
- I do believe that coordination is adequate, but can always be improved. And this can be done through more drills which involve all levels of government.
- To take someone off of their primary assignment to participate in training or tabletop exercises requires a replacement. This replacement costs money in overtime to ensure that public safety is not compromised during the training and coordination exercises.
- Coordination can be improved by achieving common communications protocols, real-time field training and brief and concise written policies and procedures that are Web-based shared and are updated at least once a year.
- As for the community, I think improvement can be achieved by the CERT program. This training is designed to prepare the community in the event of a catastrophic disaster and residents are trained to help their family and neighbors in a disaster.

### *Improving Coordination with the Private Sector*

In response to the question as to how to improve coordination with the private sector, 85 percent of the emergency managers responded that there should be more proactive approaches to include the private sector. Examples of proactive approaches included the following:

- Provide training, education, and information for the private sector prior to disaster.
- Use of memorandum of agreement (MOA) with relevant private sector organizations that detail the nature of coordination and responsibilities of all parties.
- Establish trust with the private sector prior to a disaster to facilitate communication during a disaster.
- Create and expand “partnerships” with private-sector volunteers.
- Create a system of continuous monitoring of the community to increase awareness of new private-sector groups and organizations that should be involved.
- Include private sector representatives on government emergency preparedness committees to work together to develop policies and standardize emergency procedures and operations.

Typical responses of emergency managers on how to improve coordination with the private sector included the following:

- There are two new acronyms, COG and COOP. COG is continuity of government and COOP is continuity of operations. Both depend on the private sector being heavily involved in the preparedness and recovery process.
- Coordination with the private sector can help ensure everyone is on the same page. This will help reduce confusion and anxiety before, during, and after a disaster. One way to do this is to have community/governmental committees that meet regularly.
- Private–public partnerships already exist in the division and have vastly assisted us in all aspects of emergency management (before, during, and after). Private sector representatives volunteer to serve in various capacities from committee membership to advisory roles to offer oversight and advice to the Director of Civil Defense and the Vice Director of Civil Defense.
- Establishing relationships with the private sector prior to an event can help create trust and facilitate communication during an event. More communication and relationship building should begin before an event occurs.
- Our office maintains a robust coordination program to include regular meetings and contacts with our hotels, private sector businesses, energy suppliers,

utilities, nongovernment entities such as the American Red Cross and other private and government organizations. Disaster preparedness outreach and education for all sectors are vitally important to ensure a coordinated public response to a disaster. We can always improve this effort by continuously monitoring our community to ensure we are aware of new and emergent groups or organizations that we should be communicating or coordinating with.

### *Improving Coordination with the Media*

In response to the question as to how might the media assist in emergency coordination before, during, and after disasters, most emergency managers felt that coordination with the media is essential to effective disaster management. Respondents noted the following ways to improve coordination with the media:

- Include media representatives and those journalists whose responsibility is to report on disaster in government sponsored emergency management coordination training sessions.
- Develop a closer working relationship between first responders and the media.
- Develop a closer working relationship between designated government agencies for disaster response and the media.
- Embed media representatives within the disaster management organizations and community level disaster drills and exercises.
- Develop a plan to increase the mutual effort on the part of media and emergency managers to provide accurate information in a consistent and timely manner before, during, and after disasters.
- Develop a plan to reduce turnover among disaster reporters to improve continuity of public reporting.

Some typical responses of emergency managers on improving coordination with the media included the following:

- Coordination with the media can be improved by researching and implementing some type of incentive (i.e., tax credits) to participate in emergency management communications programs such as the Emergency Alert System (EAS) and Amber Alert.
- The media is the best means of getting important information out to the public in a timely and accurate way. If a good working relationship is developed and nurtured, the media will do everything in its power to convey important information, be it preparedness information or actual “as it’s happening” disaster information. The personnel in media, however, seem to constantly change. Therefore, we are continually working on establishing new relationships or nurturing existing ones.

- The major problem is the media themselves. If they would cooperate, coordination is no issue. However, they are profit oriented and will do anything to get a scoop. That attitude has a very negative effect on the ability to work within coordination guidelines.
- We have an excellent and caring media here in both print and television journalism. The most important issue is that as responsible journalists they are always willing to ask first, get educated, and then print or broadcast. The difficulty, however, is the high turnover rate in print and television reporters. This unfortunately leads to a need to regularly educate new staff on how the Civil Defense system operates in Hawaii.
- The problem with the media is that they look for sensationalism . . . they are for profit and need the “big” breaking news. What is needed is more responsible reporting. This will help get information to people before, during, and after a natural disaster.
- Reporting accurately. The media needs to use the correct terminology when reporting the news. For instance, they come up with “Hurricane Alerts.” There is no such thing. There are Hurricane Watches and Warnings. Maybe a closer working relationship between the first responders and the media would allow for better coordination.

## ***Conclusion***

The results of the survey of emergency managers in Hawaii included several extremely valuable recommendations that pertain to intergovernmental, private sector, and media coordination. These recommendations should be taken seriously and implemented throughout the country, adjusted somewhat for local conditions, issues, and problems. Hawaii, in some ways, can be considered as providing a model for reasonably effective disaster preparedness and response and should be further studied by high-level decision-makers from relevant organizations in the public, private, and nonprofit sectors that are responsible for homeland security.

## **Summary and Recommendation**

Effective disaster preparedness and management require coordination and collaboration among public and private agencies and organizations on the local, state, national, and even international levels. The massive potential and actual loss of life and property due to natural and man-made disasters compel emergency planners and managers to improve upon existing disaster readiness and response plans and actions to minimize the devastating consequences. Glaring deficiencies of the emergency response systems were exposed in the wake of disasters such as the

terrorist attack on the World Trade Center and the Pentagon on September 11 and the battering of Hurricane Katrina.

The technical, resource, political, and bureaucratic problems that surfaced seemed to be eclipsed by the woeful lack of coordination and collaboration among key elements in the emergency response systems. For example, the lack of interoperable communication systems, the inadequate training and equipment, and the interagency rivalries, may well have been addressed prior to the disasters through intra- and interagency coordination and collaboration among rank and file. The unprecedented terrorist attack of 9/11 turned attention to homeland security threatened by man-made disasters, whereas Hurricane Katrina exposed the vulnerability of an uncoordinated emergency command system overwhelmed by a natural disaster.

Subsequent analysis of recent disasters suggests that an “all risk/hazards” approach in the preparation and response to both man-made and natural disasters may help to mitigate the problems of coordination by building a strong, basic capacity for local emergency response. This would include a first-response system with personnel trained and equipped to handle a wide range of emergencies. Finally, a survey of emergency managers in Hawaii highlighted the need for intergovernmental, private sector, and media coordination in preparing for and responding to a major man-made or natural disaster.

## References

- Bentley, E. and Waugh, W., Katrina and the necessity for emergency management standards (Ed.), *Journal of Emergency Management*, Vol. 3, No. 5, 2005, pp. 9–10.
- Block, R., FEMA points to flaws, flubs in terror drill, *Wall Street Journal*, October 31, B1. See the report at Department of Homeland Security, Top Officials (TOPOFF) Exercise Series: TOPOFF2—After Action Summary Report for Public Release, December 19, 2003.
- CBSNEWS.COM, Hijackers remain mysterious, September 11, 2002, [www.cbsnews.com//stories/2002/09/11/september11/main\\_521523.html](http://www.cbsnews.com/stories/2002/09/11/september11/main_521523.html), 2002.
- Central Pacific Hurricane Center (CPHC), The 1992 central pacific tropical cyclone season, <http://www.prh.noaa.gov/cphc/summaries/1992.php#1niki>. Retrieved from the World Wide Web on March 13, 2006.
- Cigler, B.A., Who’s in charge: The paradox of emergency management, *PA Times*, Vol. 28, No. 5, 2006, pp. 7, 10.
- EOSDIS, Synergy IV: Improving access to and application of EOA data, *Final Report*. Raytheon Company, Upper Marlboro, Maryland, 2005.
- Farazmand, A., Crisis management or management crisis? *PA Times*, Vol. 28, No. 10, 2005, pp. 6, 10.
- Federal Emergency Management Agency (FEMA), A nation prepared: Federal emergency management agency strategic plan. Fiscal years 2003–2008, U.S. Government Printing Office, Washington, DC, 2003.

- Griffith, R.L. and Oshiro, R.C., The Queen's health system: Overview 99, The Queen's Medical Center, Honolulu, Hawaii, 1999.
- Gulick, L., Notes on the theory of organization, *Papers on the Science of Administration*. L. Gulick and L. Urwick (Eds.), Institute of Public Administration, New York, 1937, p. 1.
- Harris, J., State should keep hurricane fund intact for next disaster, <http://starbulletin.com/2001/12/30/editorial/editorials.html>. Honolulu Star Bulletin, 2001. Retrieved from the World Wide Web on March 18, 2006.
- Hawaii Geographic Information Coordinating Council (HGICC), Geographic Information Systems for Hawaii State Government Agencies, *The Hawaii State-wide GIS Program*, 2006, [www.hawaii.gov/dbedt/gis](http://www.hawaii.gov/dbedt/gis).
- Hood, C., *The Art of the State: Culture, Rhetoric, and Public Management*, Oxford University Press, Oxford, 1998, p. 25.
- Jansen, B., *Panel: Unfixable FEMA Should Close*, Portland Press, Herald, April 2006, p. 1.
- Kamen, A., Hawaii Hurricane Devastates Kauai, 1992, <http://www.washingtonpost.com/wpsrv/weather/hurricane/poststories/iniki.htm>.
- Ketrl, D., *The States and Homeland Security: Building the Missing Link*, Century Foundation, New York, 2003. [www.tcf.org/publications/homeland\\_security/kehlpapers/kehl.pdf](http://www.tcf.org/publications/homeland_security/kehlpapers/kehl.pdf).
- Ketrl, D., Contingent coordination: Practical and theoretical problems for homeland security, *American Review of Public Administration*, Vol. 33, 2003, pp. 253–277.
- Lewis, D., Political appointments, bureau chiefs, and federal management performance, 2005, [www.wss.princeton.edu/researchpapers/09\\_05\\_dl.pdf](http://www.wss.princeton.edu/researchpapers/09_05_dl.pdf), [www.fema.gov/doc/library/tex\\_reader\\_fema\\_start\\_plan\\_fy03-08.doc](http://www.fema.gov/doc/library/tex_reader_fema_start_plan_fy03-08.doc).
- Mangum, C., *Hawaii State Civil Defense Bulletin*, Asia-Pacific Homeland Security Summit, Vol. 3, November 20, 2003, p. 2.
- Mouginis-Mark, P., *Disaster Management in the Pacific and Indian Ocean Regions*, Research Corporation University of Hawaii (RCUH), Honolulu, Hawaii, 2005.
- PA Times, DHS announces changes for FEMA, *American Society of Public Administration*, Vol. 29, No. 3, March 2006, p. 1.
- PA Times, Homeland security secretary announce new agenda for DHS, *American Society of Public Administration*, Vol. 28, No. 8, August 2005, p. 2.
- Peach, D., What hurricane Andrew tells us about how to fix FEMA. [http://www.theinformationist.com/index/trifecta/comments/fema\\_andrew\\_katrina\\_gao](http://www.theinformationist.com/index/trifecta/comments/fema_andrew_katrina_gao). United States General Accounting Office. March 18, 2006, p. 93.
- Prizzia, R., Emergency management and disaster response in Hawaii: The role of medical centers and the media, *Journal of Emergency Management*, Vol. 2, No. 4, 2004, pp. 43–49.
- Prizzia, R. and Helfand, G., The day after: Rebuilding mainland, USA, *When Terrorism Strikes Home: Defending the United States*, James Fagin (Ed.), Pearson Publishers, New York, 2006.
- RAND Press Release, Rand study finds emergency responders believe they have inadequate protection, August 20, 2003. [www.rand.org/hot/press.03/08.20.html](http://www.rand.org/hot/press.03/08.20.html). See Tom LaTourrette, D.J. Peterson, James T. Bartis, Brian A. Jackson, and Ari Houser, *Protecting Emergency Responders*, Vol. 2, Santa Monica, CA: RAND, Community Views of Safety and Health Risks and Personal Protection Needs, 2003.

- Robinson, R., McEntire, D.A., and Weber, R.J., *Texas Homeland Defense Preparedness*, Century Foundation, New York, 2003, p. 28.
- Rudman, R. and Metzler, J., Emergency responders: Drastically underfunded, dangerously unprepared. Washington: Council on Foreign Relations, Vol. 1, No. 6, 2003, [http://www.cfr.org/pdf/Responders\\_TF.pdf](http://www.cfr.org/pdf/Responders_TF.pdf).
- Sensenig, D., Emergency management: Proactive or reactive? Both!, *PA Times*, Vol. 22, No. 3, March 1999, pp. 2–4.
- Shea, R.F., FEMA Reengineering for Catastrophe Readiness and Response, Acting Director of Operations, FEMA, presentation at Emergency Management and Homeland Security/Defense Higher Education Conference, National Emergency Training Center, Emergency Management Institute, June 5–8, 2006.
- Shirkhodai, R., Hazard clearinghouse: A decision support capability, Pacific Disaster Center, Kihei, Hawaii, 2003.
- Simon, H., *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organizations*, MacMillan, New York, 1947.
- Sommer, A., The people of Kauai lived through a nightmare when the powerful storm struck, <http://starbulletin.com/2002/09/08/news/story5.html>, Honolulu Star-Bulletin, September 8, 2002.
- Taylor, F.W., *Principles of Scientific Management*, Harper and Brothers, New York, 1911.
- US Army Corps of Engineers, Hurricane Iniki Assessment, [http://www3.csc.noaa.gov/hes\\_docs/postStorm/H\\_INIKI\\_ASSESSMENT\\_REVIEW\\_HES\\_UTILIZATION\\_INFO\\_DISSEM](http://www3.csc.noaa.gov/hes_docs/postStorm/H_INIKI_ASSESSMENT_REVIEW_HES_UTILIZATION_INFO_DISSEM), 1993.
- US Department of Health and Human Services, Accountability Report: Fiscal Year 2001. Washington DC: U.S. Government Printing Office, viii, <http://www.hhs.gov/of/reports/account/acct01/pdf/intro.pdf>.
- Wells, J., Catastrophe Readiness and Response, (Paper Presentation) The Emergency Management Institute (EMI), 9th Annual By-Invitation Emergency Management & Homeland Security/Defense Higher Education Conference, National Emergency Training Center, Emmitsburg, Maryland, June 6–8, 2006.