

Natural Disasters: Impact, Policy, Assessment, and Collaboration

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Despite the efforts of politicians and public administrators, natural disasters continue to claim lives, inflict injury, and devastate landscapes across the country. One way to reduce the impact of these disasters is to create a plan of action that involves governmental and nongovernmental actors. The purpose of this paper is to provide a brief history of major natural disasters in the United States, discuss governmental and nongovernmental organizations involvement in disaster relief, and to provide an emergency management collaboration model to reduce the impact of natural disasters.

Despite major technological advances in the United States and other countries, the ability to predict and manage the level of potential devastation and logistically cope with the destructive power of natural disasters is limited. The impact of Hurricanes Katrina and Rita in 2005 reinforced the problems associated with the implementation and enforcement of natural disaster and emergency management policy as the area affected by the hurricanes and flood became a logistical, political, and administrative nightmare for all of those involved.

The purpose of this paper is to provide a brief history of major natural disasters in the United States, discuss governmental and nongovernmental organizations involvement in disaster relief, and to provide an emergency management collaboration model. We chose this format because we want to emphasize the fact that natural disasters are becoming more common place and the need for governmental and nongovernmental organizations and institutions to collaborate in effective emergency management is no longer an option, but a necessity.

Overview of Natural Disasters in the United States

Although residents of the U.S. have been quite immune to calamities that have struck other parts of the world, we are not immune to natural disasters. Evidence indicates that the frequency and devastation inflicted by natural disasters in the U.S. has increased over time. In fact, 9 of the top 10 costliest hurricanes in the U.S. have occurred since 1990. Further, 18 of the top 20 costliest hurricanes occurred after 1970 (National Hurricane Center 2006).

Table 1 shows the number of hurricanes, tornadoes, and earthquakes that have struck the United States since 1960. First, the data shows that the number of named

tropical storms has increased over time. The National Hurricane Center gives a name to a tropical storm when it reaches wind speeds of 39 miles per hour (35 knots). A tropical storm becomes a hurricane when wind speeds reach 74 miles per hour (65 knots) (National Hurricane Service 2006). The data in Table 1 indicates a pretty consistent increase in the number of hurricanes since 1960.¹

Second, the data shows that the number of magnitude 7.0 or greater earthquakes over the period listed has decreased slightly. However, according to the U.S. Geological Survey, the total number of earthquakes since 1990 has increased. Their data indicates that there were 2,268 earthquakes in 1990, 2,725 in 1995, 2,342 in 2000, and 3,650 in 2005 (<http://www.usgs.gov/>). Hence, the average number of hurricanes is on the rise, at least for the last 15 years. The last piece of data in the table shows the number of tornadoes in the U.S. has continued to increase in the U.S. since 1960. Strikingly, the data shows that the number of tornadoes has more than doubled since 1980 and tripled since 1960.

Table 1 Number of Natural Disasters in the U.S.

	1960	1965	1970	1975	1980	1985	1990	1995	2000	2004
Tornadoes	616	897	653	919	866	684	1133	1234	1342	1820
Hurricanes*	7	6	10	9	11	11	14	19	14	15
Earthquakes**	22	22	29	21	18	15	18	20	15	15
TOTAL	645	925	692	949	895	710	1165	1273	1371	1850

*Named Storms ** Magnitude 7.0 and greater earthquakes.

Sources: <http://www.spc.noaa.gov/archive/tornadoes/ustdbmy.html>; <http://neic.usgs.gov/>; <http://weather.unisys.com/hurricane/atlantic/>; <http://www.hprcc.unl.edu/nebraska/NEBTORNADOFACTS.html>

Table 2 lists eleven hurricanes that struck the United States by year along with the estimated costs and the number of people who died or were displaced. As expected, the data shows that states that lie along the nation’s coastline are the most likely to be severely impacted by hurricanes and tropical storms. Although the financial impact of these storms vary, it is clear that the financial toll is considerable and has remained steady over time. What is promising from this data is that the number of deaths associated with hurricanes has decreased over time. The one recent exception to this trend is the victims of Hurricane Katrina.

¹The data in tables 1-5 are all based on estimates. We searched dozens of well respected websites and found conflicting information. As a result, we tried to use the “best” estimated based on the number of times the data was repeated. We had particular trouble finding reliable estimates of cost.

Table 2 Significant Hurricanes/Tropical Storms in the U.S. Since 1950

<i>Year</i>	<i>Name</i>	<i>Cat.</i>	<i>Primary Areas Affected</i>	<i>Cost (est.)</i>	<i>Deaths/Displaced</i>
1955	Diane	3	Florida	\$831 Million	184
1965	Betsy	4	Florida	\$1 Billion	75
1969	Camille	5	Gulf Coast	\$4.2 Billion	255/>9,000
1972	Agnes	1	Florida, NE US	\$2.1 Billion	122
1979	Frederic	3	Alabama and Mississippi	\$2.3 Billion	5
1989	Hugo	5	South Carolina	\$15 Billion	86
1992	Andrew	5	Florida & Louisiana	\$26 Billion	26
1995	Opal	4	Florida & Alabama	\$3 Billion	9
1996	Fran	3	North Carolina	\$3.5 Billion	37
1999	Floyd	4	Mid Atlantic, NE US	\$4.5 Billion	56
2005	Katrina	4	Louisiana, Mississippi	\$100 Billion+	>1,200/Over 1 million est.

Source: <http://www.easternct.edu/depts/amerst/disasters.htm#Floods>;
<http://www.aoml.noaa.gov/hrd/Landsea/deadly/Table3.htm>;
<http://weather.unisys.com/hurricane/atlantic/>

Unlike hurricanes, tropical storms, and to some extent flood and tornadoes, earthquakes often occur without warning. Data from the Center for Earthquake Research and Information at the University of Memphis indicates that an earthquake occurs somewhere in the United States everyday. In most cases, the magnitude of earthquakes is so small that the average citizen would not notice them. In other cases, as evidenced by the data in Table 3, the impact can be catastrophic. For the most part, catastrophic earthquakes in the United States appear to be confined to the west coast. Since 1950, the devastation caused by these occurrences has surpassed the \$50 billion dollar threshold. The 1994 earthquake in Northridge, California cost \$15 billion dollars (estimated), with more than 9,000 residents affected (http://neic.usgs.gov/neis/eqlists/10maps_usa.html, <http://www.easternct.edu/depts/amerst/disasters.htm#Floods>). Overall, the number of deaths, injuries, and cost associated with earthquakes appear to be a function of location. When earthquakes occur in heavily populated areas, the cost is likely to be higher with more deaths and injuries.

Table 3 Significant Earthquakes and Volcanic Eruptions in the U.S. Since 1950

<i>Year</i>	<i>Mag.</i>	<i>Primary Areas Affected</i>	<i>Cost (est)</i>	<i>Deaths/Injured</i>
1952	7.3	Kern County California	\$60 Million	12
1957	8.8	Alaska	\$5 Million	0
1959	7.3	Montana	\$11Million	28/
1964	9.2	Prince William Sound, AK	\$311 Million	125/
1971	6.7	California	\$505 Million	65/2,000
1980	-	Mt. St. Helen Eruption	\$1.1 Billion	60/>1,000
1983	6.4	Coalinga, CA	\$31 Million	0/47
1989	6.9	Near San Francisco	\$6 Billion	63/3,757
1992	7.2	Landers, CA	\$92 Million	3/400 Injured
1994	6.7	Northridge, CA	\$15 Billion	60/>9,000

Source: http://neic.usgs.gov/neis/eqlists/10maps_usa.html;
<http://www.easternct.edu/depts/amerst/disasters.htm#Floods>;
http://neic.usgs.gov/neis/eq_depot/usa/

Tornadoes are almost as common as thunderstorms in some parts of the country. Unlike hurricanes, tornadoes are likely to occur almost anywhere on the continent. While the geographical impact of tornadoes is considerably smaller than hurricanes, the amount of devastation and impact on human life can last for decades. The most significant data noted in Table 4 is the number of deaths and number of people injured as a result of tornadoes. In both cases, the numbers are considerably higher than with hurricanes and tropical storms. Unlike hurricanes, tornadoes are not very predictable. However, similar to the preceding discussion, the total number of deaths and those injured has gone down over time. The table also shows that catastrophic tornadoes frequently occur in groups rather than as a single tornado. For example, four cited tornadoes hit Tennessee and Arkansas in 1999 inflicting an estimated \$1.3 billion in damages. Two other hurricanes in Oklahoma and Kansas cost an estimated \$1 billion in damages in the same year. Comparatively speaking, only a small number of casualties resulted from the storm systems.

Table 4 Significant Tornadoes in the U.S. Since 1950²

<i>Year</i>	<i>Primary Areas Affected</i>	<i># of Tornadoes</i>	<i>Cost</i>	<i>Deaths/Injured</i>
1952	Arkansas and Tennessee	28		204
1953	MI, TX	2		229/1441
1965	IO, IL, IN, OH, MI, & WI	>5		256
1971	MS, LA, AR, & TN	10		121
1973	Georgia	1	\$5.2 Billion	
1974	13 States	148	\$600 Million	330/5,484
1985	Pennsylvania & Ohio	27	\$450 Million	756/250
1990	Illinois	1		29/>300
1992	Texas to Ohio Valley	94	\$291 Million	26/35
1999	Tennessee & Arkansas	4 (est)	\$1.3 Billion	17/>100
1999	Oklahoma & Kansas	2	\$1 Billion	49/898
2000	Southwest Georgia	5	\$25 Million	19/Over 100
2002	Central & Southeast	70		36
2003	South and Midwest	400		42

Source: Schirber 2004; <http://www.infoplease.com/ipa/A0001445.html>;
<http://www.tornadoproject.com/toptens/toptens.htm#top>;
<http://www.e11th-hour.org/resources/timelines/10.costliest.tornadoes.us.html>

Table 5 list significant floods that occurred in the United States since 1950. The data shows the number of significant floods have occurred primarily in the Midwest and western states. The data also shows that the cost of floods has continued to rise over time.

²The majority of the tornadoes listed here occurred in spurts over a two-three day period and covered multiple geographical regions.

Table 5 Significant Floods in the U.S. Since 1950

<i>Year</i>	<i>Primary Areas Affected</i>	<i>Cost (est)</i>	<i># of Deaths</i>
1950	Oklahoma, Kansas, & Missouri	\$870 Million	15
1964-1965	Pacific Northwest	\$430 Million	47
1969	Louisiana and Mississippi	\$1.4 Billion	259
1972	West Virginia	\$60 Million	125
1972	Northeastern U.S.	\$3.2 Billion	117
1972	South Dakota	\$160 Million	237
1983	Utah	\$621 Million	Unknown
1985	Virginia and West Virginia	\$1.25 Billion	69
1990	Arkansas, Texas, and Oklahoma	\$1 Billion	17
1993	MS River in Central U.S.	\$20 Billion	48/70,000 Homeless
1995	South Central U.S.	\$5-6 Billion	32
1995	California	\$3 Billion	27
1996	Pacific Northwest and Montana	\$1 Billion	9
1996-1997	Pacific Northwest and W. Montana	\$2-3 Billion	36
1997	North Dakota and Minnesota	\$2 Billion	8
1997	Ohio River	\$1 Billion	67
1999	North Carolina	\$6 Billion	42

Source: <http://ks.water.usgs.gov/Kansas/pubs/fact-sheets/fs.024-00.html>;
<http://www.easterncr.edu/depts/amerst/disasters.htm#Floods>

Since 1985, there have been at least nine floods that have surpassed the billion dollar threshold. The 1999 flood in North Carolina was estimated to cost \$6 billion and the 1995 flood in the south central U.S. cost \$5-6 billion and left 70,000 people homeless. Ironically, the cost of floods does not have a positive correlation with the number of flood victims since the 1970s. That is, the number of flood victims has been relatively small given the amount of physical damage inflicted by the floods.

Emergency Management and Collaboration

Public policymakers, administrators and technicians throughout history have sought to predict the unexpected in order to reduce the risk to human life and safety. To this end, statutes, regulations, and ordinances have been passed emphasizing the role of federal, state, local and nongovernmental organizations and institutions in emergency management. Generally speaking, public administrators have primarily left emergency management to those who work in law enforcement and fire departments. Today, we see much more activity at the federal and state level relative to emergency management and these activities have trickled down to local levels. Despite these efforts, Hurricanes Katrina and Rita have reinforced the gaps in/application of emergency management policy and techniques. The next three sections examines, communicating information, developing an emergency management relief plan, the roles of government and a model for emergency management.

Communicating Information in Emergencies

For the most part, the federal government initiates and enforces emergency management policy in the United States. However, state and local governments shoulder

a greater burden when disaster strikes their communities (Schneider 2005). Heide (1989) argues that one of the key components in managing disasters is the dissemination of accurate information. He discusses four types of information needed during disasters. First, there should be a continuous assessment of what the disaster situation is and what disaster countermeasures are needed. Second, there should be a continuous assessment of what resources are needed to implement the countermeasures. With that said, the following questions should be addressed. What resources are available? What additional resources are needed? How long will it take to acquire the needed resources? What is the capacity of those resources? Third, prioritize where countermeasures should be put in place. Fourth, what personnel and organizations are needed to coordinate and implement the counter measures (p. 80-81)?

Heide (1989) suggests that one of the main problems affecting communication is personal, political and jurisdictional disputes. One way to facilitate the problem is to communicate and coordinate emergency management plans prior to disasters occurring by establishing mutual agreements. These agreements should highlight responsible organizations as well as persons responsible for various tasks. When possible, standard procedures, resources, terminology and performance criteria should be applied. When this stage is completed, he recommends joint planning and training so that the different state and local agencies and organizations can increase their level of awareness and mutual trust (see also Rubin and Barbee 1985; Burkhart 1991).

Developing a Relief Plan

The advent of satellite systems and other technology has provided much information for preparation and responses to natural disasters. However, using this information to coordinate activities has not been an easy task. This problem is exacerbated by the fact that a large percentage of the population in the U.S. live in areas that are prone to natural disasters. The Federal Emergency Management Agency (FEMA) has taken the leadership role in developing emergency management policy in the United States. In so doing, they developed a four-step plan to emergency management which is used as the crux for our remaining discussion (<http://www.fema.gov>; see also Skeet 1977; Mushkatel and Weschler 1985; Zimmerman 1985; Adams 1992). The four stages are: mitigation, preparedness, response and recovery.

- *Mitigation*: Involves developing a plan to reduce or eliminate health, safety, or welfare risk.
- *Preparedness*: After action has been taken to reduce or eliminate risk, a risk response plan should be implemented to train personnel to preserve human life and reduce potential disaster damage. This includes the identification of critical resources and the development of collaborative activities among responsible agencies in the area.
- *Response*: Provide disaster aid and support, reduce the likelihood of secondary damage, and minimize potential problems for recovery efforts.
- *Recovery*: Provide immediate assistance during the early recovery stage necessary to return vital life support systems to minimum

operation levels, and continue to provide assistance until the area returns to normal.

Skeet (1977) discussion on the national government preparation for disaster relief offers a lot of useful information that is applicable in our discussion. Although her research is geared towards the federal government, we apply the principles to all three levels of government in the U.S. She states that a “disaster relief plan should provide a clear and precise set of guidelines for government departments and other bodies which might be called upon to render service to the victims” (p. 10). The plan should be designed to coordinate federal, state, and local resources so that the needs of the population affected can be met as well as allow enough latitude to expand those services to other nearby jurisdictions. Plans should be based on information and data that chronicle the causes, frequency, effects and management of major disasters that have occurred in the vicinity (see also Paton and Jackson 2002). Further, an evaluation of potential hazardous areas, such as airports and industrial parks, should be considered in the plan. Lastly, the plan should clearly delineate who is responsible for coordinating the pre and post disaster efforts. She also offers the following suggestions that are listed in Table 6.

Table 6 Pre and Post Emergency Management Disaster Relief

Pre Disaster

1. Ensure an adequate supply of emergency reserves.
2. Open and staff a disaster coordination center.
3. Use the mass media to alert those in danger and warn neighboring jurisdiction of potential requests for services and assistance.
4. Place all necessary local and state emergency departments on alert.
5. Designate hazardous zones.
6. Enforce evacuation from threatened zones.
7. Open shelters and evacuation centers.

Post Disaster

1. Mobilize rescue services, to include ambulance, fire, police, military, civil defense, coastguard, and any other local agencies or organizations trained in this area.
2. Provide immediate assistance in the form of medical care, food, clothing, shelter, welfare services, tracing of missing persons, and post traumatic counseling.
3. Make a detailed survey of the affected area to determine the catastrophic impact and plan the economic recovery of the disaster area.
4. Coordinate relief actions of appropriate government departments and other voluntary organizations.
5. Inform the State Emergency Managing Director of all developments of operations.
6. Maintain law and order, to include traffic flow.
7. Safeguard public health, especially as it relates to the care and prevention of communicable diseases.
8. Arrange for the identification and burial of the deceased.

9. Repair and restore electricity, gas, water, sewage and communication systems.
10. Repair or replace public buildings, such as schools and hospitals.
11. Allocate grants for rehabilitation projects and compensation payments.
12. Plan reconstruction programs for permanent housing and assist in the requisition of land, supplies, services, vehicles, and labor for emergency relief operations.

The Role of the Federal Government in Emergency Management

The role of the federal government in emergency management began to change considerably in the 1950s, 60s, and 70s when Congress passed several laws expanding the scope of federal involvement in natural disasters. Specifically, Congress passed the Disaster Relief Act of 1950, which allowed federal funds to be used as a supplement to state and local resources. Other laws extended assistance to particular groups such as farmers, provided temporary housing, business loans, emergency shelters, food coupons, and to other forms of disaster mitigation. By the late 1970s, a number of departments and programs were involved in disaster relief and administrative responsibilities were haphazardly split between governmental and nongovernmental organizations. In 1978, President Jimmy Carter issued Reorganization Plan #3 and created the Federal Emergency Management Agency (FEMA) to lead the federal government's emergency management efforts. In 1988, Congress clarified the role of the federal government when it passed the Robert T. Stafford Disaster Relief Assistance Act. In addition to clarifying inconsistencies in past policies, the act created a process guide to describe the circumstances in which the entire intergovernmental network would become involved in emergency situations. Special attention was given to hierarchical responsibilities of local and state officials in emergency situations (Schneider 1998).

Today, FEMA is a division of the Department of Homeland Security and has the primary function of preparing the nation for all hazards and effectively managing federal response and recovery efforts following any national incident. FEMA also initiates proactive mitigation activities, trains first responders, makes disaster assistance available to states, communities and individuals, provide advice on building codes and flood plain management and manages the National Flood Insurance Program and the U.S. Fire Administration (<http://www.fema.gov>). FEMA has a considerable amount of resources available to state and local governments to assist them in emergency management. This includes courses designed to train government and nongovernmental agencies in emergency management (see Alexander 2003 for a discussion of standards in emergency management training).

With ten regional offices located across the country, FEMA can establish and provide important links with states as well as local governments. When local and state capacity and resources fall short of meeting the resources needed to respond and recover from disaster, FEMA provides manpower and resources as well as coordinates the efforts of other federal agencies (McLoughlin 1985; <http://www.fema.gov/about/history.shtm>).

FEMA has also allied with the Red Cross, a nongovernmental organization that has been an active participant in disaster relief. "Each year, the American Red Cross responds immediately to more than 70,000 disasters, including house or apartment fires (the majority of disaster responses), hurricanes, floods, earthquakes, tornadoes, hazardous materials spills, transportation accidents, explosions, and other natural and man-made disasters" (<http://www.redcross.org>).

The Role of States in Emergency Management

State officials have similar responsibilities as local officials. For the most part, each state has an organization that is solely responsible for emergency management in the state. This office should have direct ties to the governor's office, which is directly responsible for emergency management in the state. The state emergency management office should maintain emergency management plans, facilities and equipment needed when an actual disaster occurs. According to McLoughlin (1985) states also have the responsibility of evaluating the needs of all political and geographical jurisdictions within the state, determine the amount of state and federal resources available, and facilitate the attainment and application of these resources. States also provide guidance and assistance to local communities in creating emergency management plans and informing these communities of federal guidance and resources. When major disasters occur, the state is responsible for coordinating and communicating the activities of the state, local and nongovernmental organizations and relaying those activities to the federal government. In the past, states have limited their roles to the preparedness and response stages of emergency management and left recovery efforts to the local jurisdictions.

The Role of Local Governments in Emergency Management

Traditionally, local officials serve as the first line of defense during natural disasters (Bourgin 1983; Popkin 1990). Hence, local governments must develop and maintain an active emergency management plan with other nearby local governments and nongovernmental organizations. Generally speaking, local government emergency management officials are located in agencies that report directly to the mayor or city manager in conjunction with the police and fire departments. Traditionally, local emergency managers have focused on preparedness and response. When an actual disaster strikes, the mayor or central authority should be quick to take command along with the emergency management staff and serve as the central depository of information and the coordinator of activities with other jurisdictions, agencies, and volunteer groups (McLoughlin 1985).

The local government also has the primary responsibility of managing and training volunteers and nongovernmental organizations. When an emergency situation occurs, there never seems to be a shortage of volunteers who will offer up their services. Unfortunately, a large number of unmanaged volunteers do not ensure an adequate counter-disaster response. These resources must be identified, acquired, and applied rapidly, effectively and in accordance with the real needs of the particular disaster situation.

Rubin and Barbee (1985) make four suggestions regarding post disaster relief and the ability of local governments to mitigate, prepare, respond, and engage in recovery efforts. First, local government officials must have the *capacity to act*. That is, technical ability, resources, organizational flexibility and adaptiveness must be a part of the strategic plan in order to expedite recovery. When one or more of these elements is missing, recovery can be very slow. Second, local governments need a *reason to act*. This aspect of recovery can be a difficult task when the values of the community are not mutually agreed upon by decision makers and citizens. The dialogue surrounding the reconstruction of New Orleans following Hurricanes Katrina and Rita are evidence of a split in values and decisions regarding the economic welfare of the area. Their research suggests that the lack of cohesiveness will make recovery efforts more difficult.

Knowledge of *what to do* is also crucial. Their research showed that local government officials were very good at short-term recovery efforts and the tasks associated with those efforts. The data also showed that the experience gained in managing one disaster led to improved efficiency when a second similar disaster occurred. Lastly, the use of external emergency management experts led to more efficient and effective recovery efforts.

Political awareness and astuteness is the final area. Simply put, this area is concerned with the speed and quality of recovery. Policymakers have to make a concerted effort to facilitate recovery and at the same time, maintain the values of the community as well as prepare for the next disaster. This requires astute political and administrative leadership. Communities that fared the best during disasters had a long term plan in place that maintained the beliefs and values of the community rather than a short sighted plan that simply helped them cope with the current disaster (Rubin and Barbee 1985).

The Role of Nongovernmental Groups and Individuals

When disasters have a widespread impact on the community, volunteers can quickly become the rank and file workers needed to expedite immediate recovery efforts. These groups range from highly skilled groups such as the Red Cross to neighborhood groups to individual volunteers. It is important that local officials not only be aware of any organized groups that may be available during emergency situations, but know the extent of their training. When possible, local emergency managers should provide these groups with basic training methods and techniques that should be employed during disasters.³ Highly organized and well trained groups such as the Red Cross can also be used in the training process.

Stallings and Quarantelli (1985) point out that emergent groups often organize to plan evacuation routes, plan rebuilding a community after a disaster, to developing an emergency plan, to train and prepare a neighborhood for responding to an earthquake to name a few. In each of these instances, the group can benefit from having trained professionals involved in the process. Hence, the local emergency management office should make themselves available and encourage the formation of such groups in order to facilitate evacuation as well as recovery efforts should the need arise.

They identify three types of emergent groups that appear during emergency situations: damage assessment groups, operations groups, and coordinating groups. Damage assessment groups are those who often provide the first hand accounts of the emergency as well as engage in search and rescue. Operations groups form to collect and disseminate food and clothing to victims, assist in debris cleanup, and transmit messages using ham or citizen band radio networks (see also Heide 1989, p. 105; Oliver 1980). The third group is a coordinating group which tends to emerge during significant long term disasters. These groups can and often do behave as citizens groups as they become involved in reconstruction policy, arbitrating disputes, and other types of community problems.

³Publication such as: *Surviving Extreme Events: A Guide to Help Small Businesses and Not-for-Profit Organizations Prepare for and Recovery from Extreme Events* (Alesch and Holly 2004), *Disaster Readiness and Response* (ICMA 2004), *Disaster Resources Handbook* (Evans 2004), *Emergency Management: Principles and Practice for Local Government* (Drabek and Hoetmer 1991), and *Jane's Citizen's Safety Guide* (Shepherd, et al) are useful training guides.

For the purpose of our discussion, the focus is on operations and coordinating groups. Operations groups can emanate from preexisting neighborhood organizations or form directly as a result of a group of people conducting a disaster function. What is crucial for local government coordinating officials is to alert organized volunteer organizations such as the Red Cross at the same that they alert governmental emergency management agencies. These organizations should be aware of the location of emergency response headquarters as well as various substations if they exist. Volunteers should not be called upon to work in extremely hazardous situations unless it is absolutely necessary. This lessens the likelihood of liabilities. Trained professional should always be in charge of managing volunteers. Therefore, all emergency service workers, such as police, fire, ambulance companies, and hospital workers should return to work. This should more than double the normal capacity of these offices

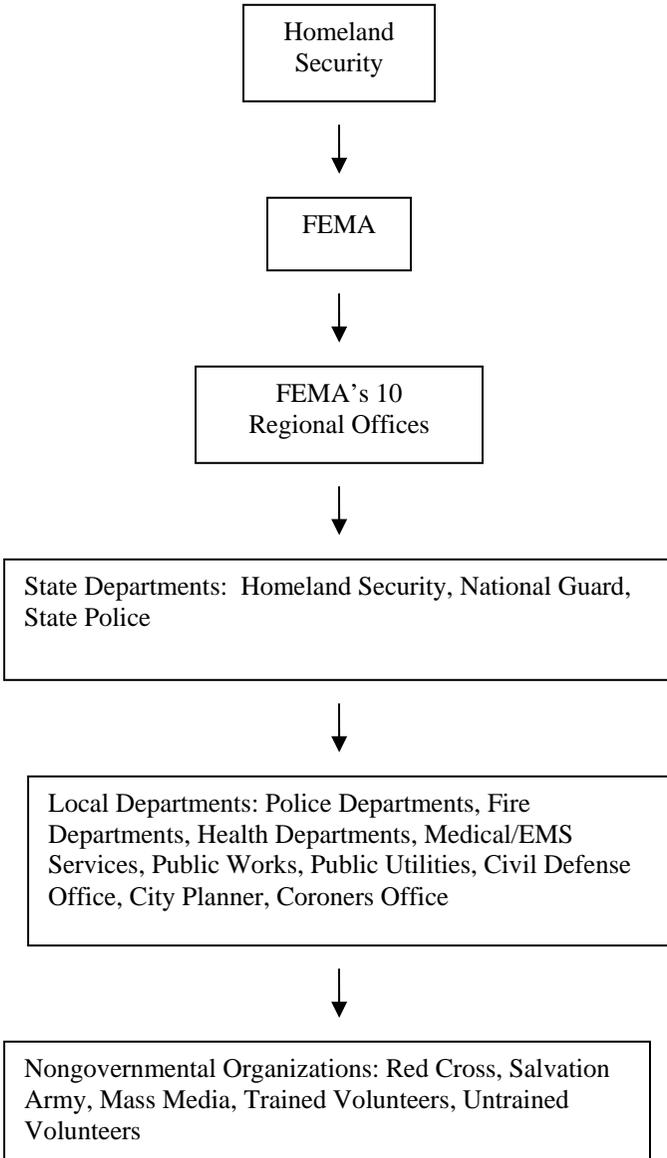
Coordinating groups are also useful because they can serve the dual function of communicating the needs of the community that they represent as well as ensure adequate representation when policy decisions are made concerning reconstruction. Again, the post Hurricane Katrina and Rita debates have left much fodder to validate the importance of these groups.

An Emergency Management Model

The model listed below is a simple model for emergency management. We have argued that the local government is the first line of assistance when a disaster occurs. Local government officials know their jurisdictions better than anyone and best know how to implement response and recovery efforts. However, the federal government's role in the process cannot be minimized. When broad based policies and information is available and disseminated from the top it is easier for the local government to react and prepare for emergencies. In sum, the ten regional FEMA offices are responsible for training, educating and assisting states in their jurisdictions. The state departments are responsible for assisting each of the local governments within their borders. Lastly, the local governments are responsible for coordinating the governmental, nongovernmental and volunteer agencies within their jurisdictions as well as form collaboratives with other local jurisdictions.

Communication in this model is not necessarily based on a one directional mode. On the contrary, local governments and states are unique and the caveats that separate them should be managed on a one to one basis. Therefore, it is important for state and federal officials to be open to the voice of local government officials prior to passage of policies and procedures.

Figure 1: A Simple Emergency Management Collaboration Model



Conclusions

Our research has shown that the number and cost of natural disasters in the United States has continued to increase throughout the 21st century. This increase has not gone unnoticed by policy makers. On the contrary, the federal government has actively pursued policies that serve to improve responses to natural disasters as well as improve recovery efforts. State and local governments have likewise sought to improve efforts within their states. However, Hurricanes Katrina and Rita have provided much evidence to the weaknesses in implementing emergency management policy in the U.S.

In the second half of our paper we provide a review of research and argue for a collaborative approach to emergency management. This approach argues for formal emergency management training to governmental agencies in crucial positions as well nongovernmental organizations. We also argue that the lines of communication should flow in both directions and across offices within the various levels of government. Quite naturally, a model is only as useful as the entity utilizing it. Hence, it is crucial that all those involved in the process understand their role and follow the chain of command.

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