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Influence of Decision Making During Disasters and How It Impacts a Community

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ABSTRACT

The frequency of natural disasters occurrences has increased and is becoming noticed by many due to the impact on economy, society, and the environment.

Decision making during disasters contributes towards community safety and resilience. Decisions taken to protect people from disasters have an impact on society, economy, environment, travel patterns, and reliability and performance of transport networks. Decisions often affect the performance of transport networks and critical infrastructure systems during disasters and during demand times.

Decision making and decision styles which were observed during disaster events will show the areas that the decisions have worked well or created more risks to the society. Risks to the community due to environmental disasters are high, and they are worsened when integrated with poor decision making and actions. Good decision making provides for community resilience, good connectivity between cities, improved efficiency, safety to communities, and improved network reliability to all road users during disasters.

This paper will examine decision-making scenarios used during disasters and how they impacted the community and provided for community resilience. The case study will identify ways to integrate decision making into disaster risk reduction and shows the decisions made during extreme events and how they impacted on the community and transport infrastructure.

Keywords: decision making, community resilience, transport planning

1. RESEARCH FRAMEWORK

Decisions made during disasters will have numerous effects on the long-term performance of a country's infrastructure as well as the resilience of communities. A research project conducted at RMIT University in collaboration with the City of Greater Geelong Council in Victoria, Australia, aimed to identify gaps in the decision-making process that contribute to risk and resilience of performance of critical infrastructure. Triple bottom line analysis was carried out to identify how decision making impacts the economy, environment, and the society. The process relied heavily on recorded case studies of natural disaster and decision-making failure and gaps. The overall research framework is shown in Figure 1.

Decision intensity changes according to the dynamic nature of the disaster. Decisions made during normal day-to-day conditions against decisions made during disaster events have totally different decision-making styles. The impacts from these two decision-making scenarios will have numerous effects on the long-term performance of a community's resilience, economy, environment, and critical infrastructure.

This paper focuses on the decision making during a disaster scenario to ascertain the impact and the gaps for improvement.

2. DISASTERS

There are many types of disasters which impact all countries, Natural and man-made hazards have the same end result of causing death for people and animals, destroying infrastructure, and causing damage to the economy of communities and countries. The effects of disasters are felt immediately in some instances, and in others it is felt at a later time. The secondary impacts could be the effects on critical infrastructure failures. A *hazard* is a physical event, phenomenon, or human activity that can cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation (Leoni, Radford, & Schulman, 2010). So the hazards

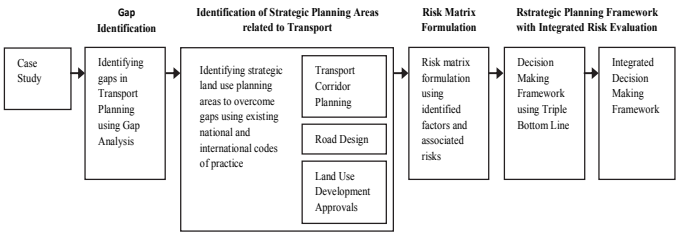


Figure 1. Overall research framework

have the capability to directly cause damage and destruction or have a secondary impact. Disasters are a combination of hazards, conditions of vulnerability, and insufficient capacity or measures to reduce the negative consequences of risk. A hazard becomes a disaster when it coincides with a vulnerable situation, such as when societies or communities are unable to cope using their own resources and capacities (Leoni et al., 2010). Disasters resulting from such natural hazards as tropical cyclones, windstorms, floods, and related landslides affect the most people. Such weather-related disasters represented about 81% of all events, 72% of all economic losses, and 23% of fatalities from 2000–2010. On average, about 37 million people are affected every year by cyclones, hurricanes, and typhoons; nearly 366,000 by landslides; and 102 million by floods (Leoni et al., 2010). Poor people are more affected by disasters than any other economic group. From 2000 to 2010, economic damage as a result of disasters totaled US $1 trillion; in 2010 alone, the total estimated damage was US $109 billion.

As shown in Figures 2 and 3, the Americas had the highest percentage of people killed due to natural disasters in 2010. But, overall between 2000 and 2009, the Asia region has the most number of disasters.

Figure 4, shows the global economic damage due to hazards from 1970–2010. There is a sharp increase in hazards between 1995 and 2010. One reason could be the present-day availability of technology used to identify and determine the cost of disaster damages.

As shown in Figures 5 and 6, floods and storms affect the most number of people, as well as cause many deaths. Therefore these two types of disasters are extremely common and deadly. Decision making for these types of disasters have to be treated with utmost care and respect. Throughout life, humans experience circumstances requiring them to make decisions involving probability information. These circumstances often require responding quickly, and the outcomes of these decisions can have life changing consequences (Andrzejewska et al., 2013).

More than 226 million people are affected by disasters every year, and in 2010 alone, 373 disasters resulted in the deaths of 226,000 and affected 207,000 persons. From 2000–2010, 400 disasters accounted for 98,000 deaths and 226,000 million affected each year. In total, 1,077,683 people lost their lives while 2.4 billion were affected by disasters during the decade (Leoni et al., 2010).

3. DECISION MAKING

Decision making is one of the basic cognitive processes of human behaviors by which a preferred

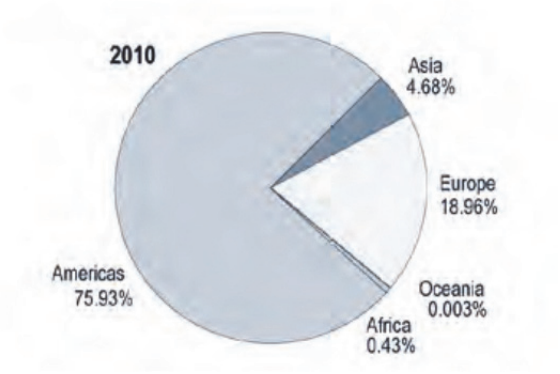


Figure 2. Percentage of people killed by disasters by region. Source: Leoni et al., 2010, p. 28

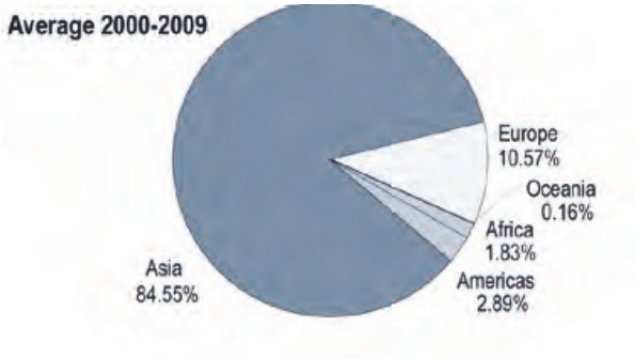


Figure 3. Disaster occurrence by area. Source: Leoni et al., 2010, p. 29

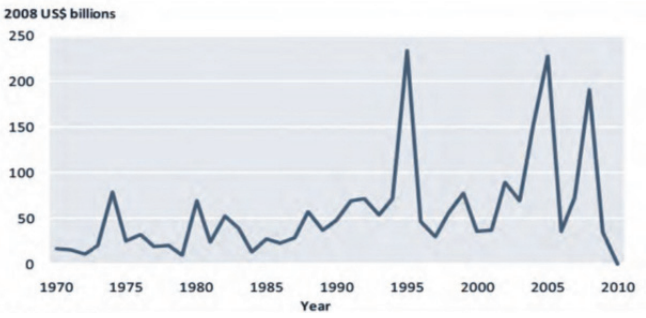


Figure 4. Global economic damages from hazards, 1970-2010. Source: Leoni et al., 2010, p. 27

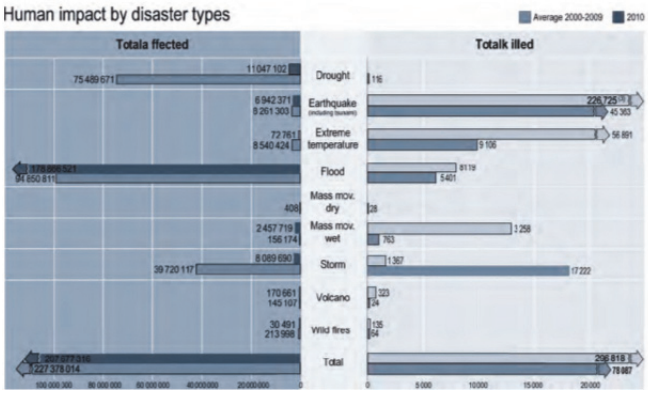


Figure 5. Disaster occurrence by Area. Source: Leoni et al., 2010, p. 29

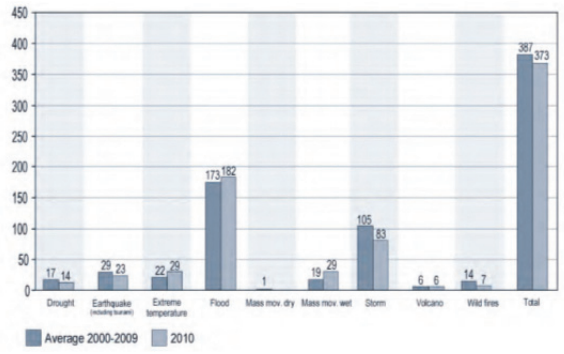


Figure 6. Disaster occurrence by disaster type, Source: Leoni et al., 2010, p. 29

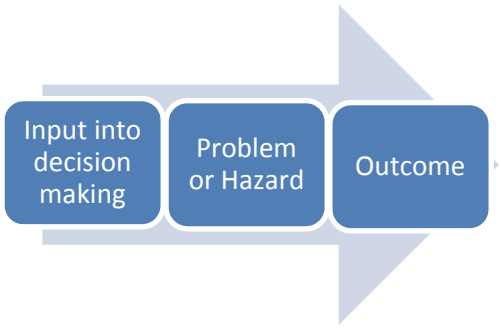


Figure 7. Decision-making process

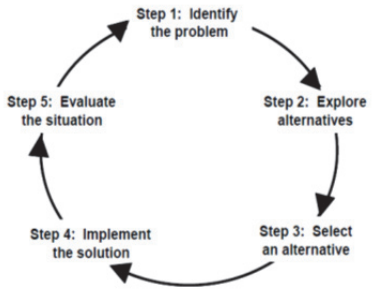


Figure 8. Decision-making process. Source: FEMA, 2005

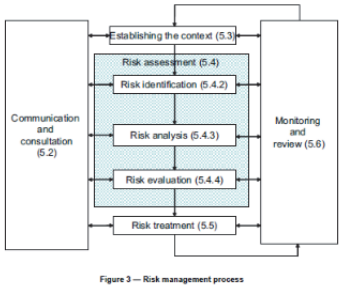


Figure 9. The risk management process Source: International Organization for Standardization [ISO], n.d., p. 14

option or a course of actions is chosen from among a set of alternatives based on certain criteria (Wang & Ruhe, 2007). People make decisions to carry out their daily tasks. In an organisation, decisions are made at every level and some get approved, discarded, or even stalled according to its culture and sometimes due to inherent bureaucratic processes. Decision makers are a special breed of people who are given the task to make responsible decisions, often from the responsible roles within organisations. Decisions are made to provide solutions to problems and to prevent a problem from being created; decision making creates many scenarios and actions that are connected with many outcomes. The outcomes of decisions change according to the dynamics of the situation. Also, the decision making depends on the decision maker's abilities, characteristics, and approach towards reaching a solution.

The decision making varies between normal-day decisions making to extreme-disaster-event decision making, such as natural weather events or even man-made disasters. Decision making during disasters changes the dynamics involved with decision-making processes and, most of the time, creates panic situations. Each decision changes according to the type of disaster and its magnitude. Decision making must be flexible, responsive, and capable of reacting to the unexpected in a timely and effective manner (Lahidji, 2003). All disasters impact people and communities, destroys or damages cities and critical infrastructure, and impacts the environment. But each disaster is different, and the decisions have to suit the needs and requirements. The time to evacuate a community to safety depends on the type of disaster and the available time to prepare and continue with the evacuation processes.

As shown in Figure 7, any person or a group of people can make decisions, but only a few can contribute toward a good outcome. To do this the decision makers have to have the required skill sets. But is it this simple or complicated when the cost of a human life was estimated at $9.1 million by the Environmental Protection Agency in 2011 (Partnoy, 2012).

Figure 8 shows a typical decision-making and problem-solving process, which states that problem solving is a set of activities designed to analyze a situation systematically and find, implement, and evaluate solutions. At each stage, a decision is required, and it is a mechanism for making choices at each step of the problem-solving process. Decision making is part of problem solving, and decision making occurs at every step of the problem-solving process (Federal Emergency Management Agency [FEMA], 2005). Figure 9 shows a typical risk-management process, which has similar steps in identifying the issues and drawing up solutions to address the risk. In both these processes, decisions are required to provide solutions. During a disaster event, the main aim of the decision maker should be to save as many lives as possible. Therefore, decision making becomes an important element in everyday process and activities. Decision making

carries a certain amount of responsibility and accountability. Decisions taken during disaster events impact a larger community and business audience and impacts on community, economy, and the environment. Managing a response to catastrophic incident requires timely, effective decision making and a systematic management approach that applies sound tested principles (U.S. Department of Transportation [USDOT & U.S. Department of Homeland Security [DHS], 2006). Therefore, it is important to identify the decision maker's capabilities before they are faced with a critical event. Decision making and management capabilities are critical to developing and implementing a successful emergency response plan (USDOT & DHS, 2006). The economic impact of large-scale disasters is significant at the local level, with physical destruction on a large magnitude, losses of lives, disruption or interruption of business output, and sharp declines in consumption (Lahidji, 2003).

Hurricane Katrina was a wakeup call for the United States, in that the hurricane revealed very significant deficiencies in the nation's ability to manage catastrophic events (Tierney, 2009). Then there is this question: how do we detect or identify a disaster and how do we plan for such a disaster? How do we communicate the disaster to the people who will be impacted by this hazard, and who is responsible for taking correct action to notify the people and all relevant organizations? In the aftermath of a disaster, governments face considerable pressure to intervene: to reduce or contain persisting dangers, compensate victims, clean up and reconstruct damaged areas, provide temporary shelters, subsidise affected industries and local governments, prevent liquidity crises, and restore confidence. In some cases in the past, the fiscal costs of disaster response have exceeded 1% of GDP for several years (Lahidji, 2003). The decision maker will take action according to a set number of priorities, such as saving people is more important than saving critical infrastructure or vice versa. Therefore, the person responsible for making these critical decisions need to have the capability to understand the intensity of the hazard and have situational awareness of the affected area. Disasters can affect everyone and are, therefore, everybody's business (Leoni et al., 2010).

In the United States, the National Response Plan defines a catastrophic incident as: "Any natural or man-made incident, including terrorism that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions." A catastrophic event could result in sustained national impacts over a prolonged period of time; almost immediately exceeds resources normally available to State, local, tribal, and private sector authorities in the impacted area; and significantly interrupts governmental operations and emergency services to such an extent that national security could be threatened. (Townsend, 2006).

3.1. Decision-Making Styles

There are many decision-making styles used by decision makers. As shown in Table 1, to arrive at a decision, many types of decision-making styles can be used.

The actions that are emitting from each decision are different and the mitigation of the impact on the society, economy, environment and critical infrastructure also differs. Decision making also depends on the culture of the organisation and size of the organisation.

Table 1. Decision-making styles

Autocratic—where one responsible decision maker makes all the relevant decisions	**Individual Decision Making:** In individual decision making, the leader must make the decision alone, and input from others is limited to collecting relevant information.
Pseudo-consultative	**Decision Making Through Consultation:** In consultation, the leader shares the issue with one or more people—seeking ideas, opinions, and suggestions—and then makes a decision. The leader considers the input of others, but the final decision may or may not be influenced by it.
Consultative	
Participative	
Delegatory	**Delegating the Decision:** When delegating a decision, the leader sets the parameters then allows one or more others to make the final decision. Although the leader does not make the decision, he or she supports it.
Democratic	Where everyone has an opportunity to input their views into the decision-making process.
Directive/Analytical/ Conceptual & Behavioural	The decisions are made according to results, empirical analysis, and also depends on the decision makers' behavioural patterns
Group Decision Making	In this case, the leader and others work together until they reach a consensus decision. Each group member's opinion and point of view is considered. As a result of helping to make the decision, group members buy into the final decision and commit to supporting its implementation.

3.2. Factors That Influence Decision Making

As shown in Table 2, the decisions are influenced by many factors.

3.3. Responsibilities of a Decision Maker

A responsible decision maker should have the knowledge about the situation and be able to carry out a situational analysis; available resources to carry out the whole process of decision making, implementation and other related requirements; team capabilities; able to understand the constraints and available time; and the level of collaboration, available technology, and experienced staff.

3.4. Characteristics of a Decision-Making Process

Defined process or framework/clear and transparent steps in the process/inclusiveness of all stakeholders/leadership

People have different styles of making decisions that depend on their personality or psychological type. Psychological type is a composite of our preferences or preferred ways of taking in and organizing information. We tend to favor one of four ways of approaching a problem:

Decisions can be as simple as delegating a routine task or as complex as responding to a major crisis. Decision making in a crisis is made more difficult because of stress.

The other area that has a bigger impact on decision making is the management structure. This may vary between having a rigid vertical communication structure to a flat one or even have a high degree of coordination and formulation structures. As per the

Table2. Factors which influences decision making

Time available to make decisions	Quality of information	Experience of decision maker
Experience of past practice	Making sense of information	Practical Knowledge gained
Available resources	Clear roles	Theoretical knowledge gained
Knowledge of affected areas	Situational awareness	Political factors
Financial factors	Environmental factors	Safety factors
Ethical factors	Organisational Culture	Size of organization

Table 3. Leadership characteristics for emergencies and disasters

Decisiveness	Problem Solving	Motivating
Flexibility	Managing Innovation and Creativity	Managing teams and team building
Informing	Planning and organising personnel	Scanning the environment
Strategic Planning	Network and Partnering	Decision Making

Source: FEMA, 2005

Table 4. Attributes of an effective decision maker

Knowledge.	The most important requirement for making sound decisions is a deep understanding of all factors. The soundness of the decision depends on how informed the decision maker is.
Initiative.	Effective decision makers assume responsibility for beginning the decision-making process and seeing it through. They take an active part in making things better.
Advice-seeking.	Good decision makers know that they need help from others. They identify people who can make specific contributions to the decision-making process and ask them for their advice and counsel.
Selectivity.	Effective decision makers seek pertinent data. They avoid getting bogged down by extraneous facts and figures.
Comprehensiveness.	On the other hand, they look at all available options and consider every possible alternative so as to make the best choice.
Currency.	Good decision makers consider current conditions and take advantage of opportunities that exist at the time.
Flexibility.	Effective decision makers remain open-minded about new concepts and ideas. They are willing to change course or try a different approach if better results seem likely.
Good judgment.	Sound decisions will not always result from merely following procedures. Decision makers must exercise their best judgment in considering factors particular to the situation.
Calculated risk-taking.	The risks and results of various alternatives must be weighed and the consequences accepted, whether positive or negative.
Self-knowledge.	Good decision makers know their own abilities, biases, and limitations.

Source: FEMA, 2005

Table 5. Decision maker's qualities

Charismatic: final decisions based on balanced information	Feeling (integrity)
Thinker: looks for extensive details	Thinking (effectiveness)
Sceptic: decides based on gut feelings	Intuition (innovation)
Follower: relies heavily on own or other past decisions to make current choices	Sensing (stability)
Controller: only implements own ideas	

Source: FEMA, 2005

Table 6. Impediments to making good decisions under stress

Perceived or real-time pressure.	Sleep deprivation and resulting fatigue.	Conflicting information.
Possible political pressures.	Lack of information.	Uncertainty.
High- or low-blood sugar levels as a result of erratic eating patterns.		

Source: FEMA, 2005

Table 7. Decisions made under stress

Under stress, decision makers are more likely to:	Decision makers under stress also tend to:	They may also:
Experience conflict with other key players.	Be less tolerant of ambiguity and thus perhaps make premature decisions.	Consider only immediate survival goals, sacrificing long-range considerations
Experience perception distortion and poor judgment.	Experience a decreased ability to handle difficult tasks and work productively.	Choose a risky alternative.
Perceive selectively because of sensory overload, and thus perhaps miss important information.	Experience a greater tendency toward aggression and escape behaviors.	Get tunnel vision. Succumb to "groupthink."

Source: FEMA, 2005

Figure 10. Hurricane strikes (1950–2009). Source: http://www.californiaacontractor.com/track_map.htm

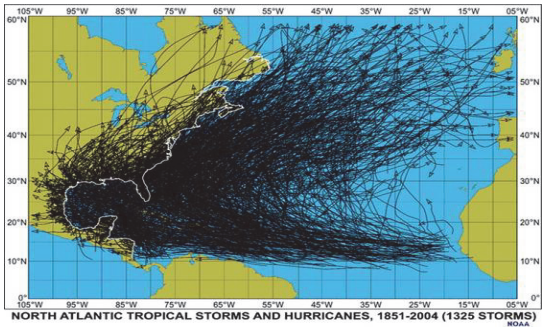


Figure 11. Tropical storms and hurricanes (1851–2004). Source: http://blog.cleanenergy.org/2011/09/05/how-wind-farms-weather-hurricanes/

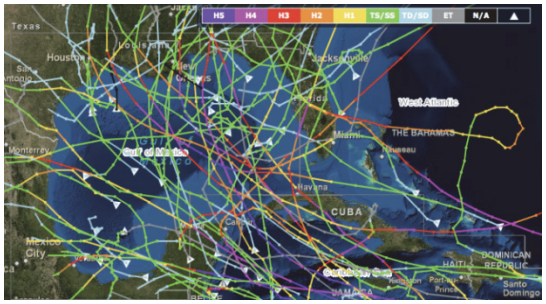


Figure 12. Hurricane paths and intensities. Source: http://blog.cleanenergy.org/2011/09/05/how-wind-farms-weather-hurricanes/

case study, the selected stakeholders are U.S. Congress, Department of Homeland Security (DHS), FEMA, governors and mayors, Department of Defence (DoD), and Department of Justice (DoJ). These organisations have different communication and decision-making styles. When each organisation has to coordinate between each other, then the cracks start to appear.

4. CASE STUDY: HURRICANE KATRINA

Risk is the probability of harmful consequences or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted, or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable populations (Leoni et al., 2010).

The report has selected 2005's Hurricane Katrina. The case study is divided into two sections, Prelandfall and Postlandfall.

4.1 Prelandfall Facts

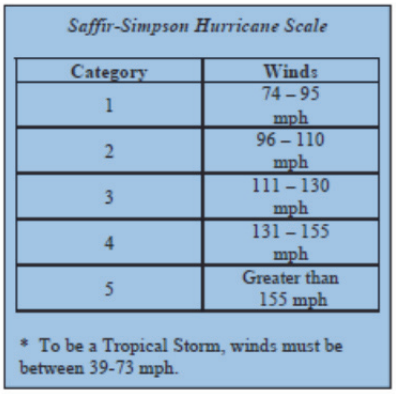
Figure 10 shows the Hurricane strikes from 1950–2009 in the Gulf Coast Region, and Figure 11 shows the tropical storms and hurricanes from 1851—2004 in the same region. Figure 12 shows the intensities of the hurricanes. Therefore, from Figures 10—12, it is shown that hurricanes and storms in the Gulf are not new phenomena. This has been happening very frequently throughout the Gulf.

The Mississippi Deltaic Plain (MDP) is a 25,000 sq. km dynamic landscape of water, wetlands, and low upland ridges formed as a series of overlapping delta lobes. (Day et al., 2007). Since 1559, 172 hurricanes have struck southern Louisiana; of these, 38 have caused flooding in New Orleans, usually via Lake Pontchartrain (Rogers, 2008). Therefore, the Katrina disaster cannot be classified as a surprise, in both the short and long term. Ample warning of the coming disaster was met with insufficient preparation (Moynihan, 2009). Furthermore, "Katrina was the much anticipated natural disaster in American history and still government managed to fail at every level" (Sobel & Leeson, 2006). "Hurricanes strike the Louisiana coast with a mean frequency of two every three years" (Rogers, 2008). Seventy-five hurricanes of Katrina's strength at landfall—a Category 3—have hit the mainland United States since 1851, roughly once every two years (Townsend, 2006).

Figure 13 shows the hurricane category by the wind speeds.

4.2. New Orleans

The New Orleans Metropolitan area is home to approximately 1.4 million inhabitants (Wolshon, 2002). New Orleans has one of the highest poverty rates (28%) in the United States (Fox & Gibbons,



Saffir-Simpson Hurricane Scale

Category	Winds
1	74 – 95 mph
2	96 – 110 mph
3	111 – 130 mph
4	131 – 155 mph
5	Greater than 155 mph

* To be a Tropical Storm, winds must be between 39-73 mph.

Figure 13. Saffir-Simpson hurricane scale

2005). A 2000 census revealed that 27% of New Orleans households, amounting to approximately 120,000 people, were without privately owned transportation (Fox & Gibbons, 2005). Another report states, “It is estimated that about 200,000 to 300,000 people do not have access to reliable personal transportation” (Wolshon, 2002). Within the city of New Orleans an elaborate system of drainage collection, pumping, conveyance, and discharge has been developed over the past hundred years, and Rogers (2008) adds that, “New Orleans has always been a high maintenance city for drainage and receives an average rainfall of about 132cm per year.” Further, the protection levee along Lake Pontchartrain was erected after the 1893 hurricane which generated a storm surge of up to 4 metres, and federal involvement with the city’s drainage canals began in 1955 with approval of the Lake Pontchartrain and vicinity hurricane projection project by Congress (Rogers, 2008). The report goes on to state that, “Since 1928 the flood protection along Mississippi River has been provided chiefly by the U.S. Army Corps of Engineers Mississippi River and Tributaries project” (Rogers, 2008). All of New Orleans and southeast Louisiana are highly vulnerable to catastrophic flooding for flood events that are in the neighbourhood of 0.2% or the 500-year return period (Link, 2010). In southeast Louisiana, communities unprotected by levees were inundated, and the storm destroyed levees protecting eastern New Orleans and the St. Bernard and Plaquemines parishes to the south and east (Day et al., 2007).

4.3. Postlandfall Facts

“Hurricane Katrina was one of the worst natural disasters in our nation’s history and has caused unimaginable devastation and heartbreak throughout the Gulf Coast Region. A vast coastline of towns and communities has been decimated,” said President George W. Bush on September 8, 2005 (Townsend, 2006).

In August 2005, Hurricane Katrina created a trail of destruction with wind speeds of 145 mph (232km/hr) and storm surge of 27 feet (8.2 metres) across 93,000 sq. miles (240,861 sq. km), killed over 1,300 people, and is considered as the most destructive natural disaster in U.S. history.

The storm surge it created along a stretch of the northern Gulf Coast from Mobile, Alabama to New Orleans, impacted nearly 93,000 sq. miles of our nation—roughly an area the size of Great Britain (Townsend, 2006).

The disaster was not isolated to one town or city, or even one state. Individual local and state plans, as well as relatively new plans created by the Federal Government since the terrorist attacks on September 11, 2001, failed to adequately account for widespread or simultaneous catastrophes (Townsend, 2006). The report further adds that, the consequences for New Orleans, which sits mostly below sea level, were dire. Significant levee failures occurred on the 17th Street Canal, the Industrial Canal, and the London Avenue Canal. The flooding destroyed New Orleans, the nation’s 35th largest city (Townsend, 2006).

Over an estimated 18-hour period, approximately 80% of the city flooded with 6 to 20 feet of water, necessitating one of the largest search-and-rescue operations in our nation’s history caused by breaches in its 350 mile levee system (Townsend, 2006).

The hurricane devastated CI power infrastructure in Louisiana, Mississippi, and Alabama. The storm surge damaged infrastructure systems and service facilities, regional potable water systems, wastewater treatment systems and sewage treatment plants, cooling towers at oil refineries, chemical plants, power stations, highway bridges. Super structures were damaged costing close to $100 billion, residential structure and content damages of $75 billion, electric utility damages of $231 million, highway damages of $3 billion, sewer system damages of $1.2 billion, completely destroyed or made uninhabitable an estimated 300,000 homes, and commercial revenue losses of $4.6 billion .

There was an extensive loss of traffic-control devices such as traffic lights, regulatory signs, and directional signs. Flooding blocked access to the police and fire dispatch centers and prevented fire crews from being able to suppress burning fires. Local emergency response officials found it difficult or impossible to establish functioning incident command structures in these conditions. The federal response suffered from significant organization and coordination problems during this week of crisis.

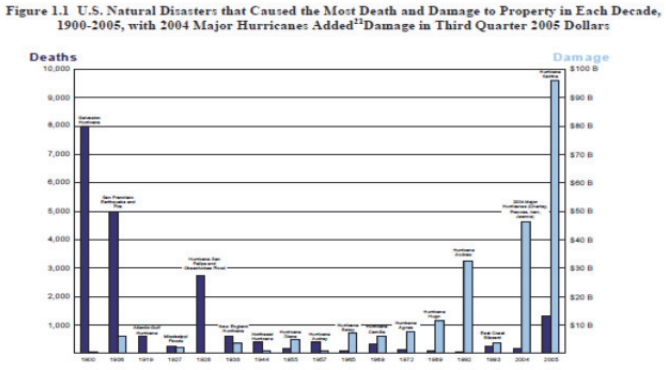


Figure 14. U.S natural disasters that caused the most deaths and damage to property in each decade (Townsend, 2006).

Table 8. Estimated damage from Hurricane Katrina and the New Orleans Flood

Housing	$67 billion
Consumer durable goods	$7 billion
Business property	$20 billion
Government property	$3 billion
Total	$96 billion

Officials responded to Hurricane Katrina without a comprehensive understanding of the interdependencies of the critical infrastructure sectors in each geographic area and the potential national impact of their decisions.

The dark blue bars in Figure 14 show the decreasing number of deaths caused by natural disasters in the period from 1900—2005. The light blue bars show the increasing amount of damage caused by these same natural disasters adjusted to third-quarter 2005 dollars (Townsend, 2006).

Hurricane Katrina's damage was extensive. The storm destroyed so many homes, buildings, forests, and green spaces that an extraordinary amount of debris was left behind—118 million cubic yards (Townsend, 2006).

When the winds and floods of Hurricane Katrina subsided, an estimated 1,330 people were dead as a result of the storm. The vast majority of the fatalities—an estimated 80%—came from the New Orleans metropolitan area. Of the total known fatalities, there are almost 200 unclaimed bodies remaining at the Victim Identification Center in Carville, Louisiana. As of February 17, 2006, there were still 2,096 people from the Gulf Coast area reported missing. Around 770,000 people were displaced—the largest since the Dust Bowl migration from the southern Great Plains region in the 1930s (Townsend, 2006).

According to the U.S. Census Bureau the city of New Orleans has approximately 484,000 residents of which approximately 130,000 live under the poverty line, an estimated 27% in comparison to the national rate of 12% (Talbot, Goldberg, & Carr, 2005).

5. DECISION-MAKING GAPS IN THE SYSTEM

Decisions taken during Hurricane Katrina are assessed to identify any shortcomings.

President Bush

Responsibilities:

- The White House shares responsibility for the inadequate prelandfall preparations. To be sure, President Bush, at the request of Brown, did take the initiative to personally call Governor Blanco to urge a mandatory evacuation.

Correct Decisions:

- On September 26, 2005, President Bush urged Congress to consider amending the Posse Comitatus Act in order for the U.S. forces to take control without delay in the aftermath of a disaster. The Posse Comitatus Act is a federal ruling that limits the ability of the government to use arm forces to respond to domestic events such as floods.
- He also took the unusual step of declaring an emergency in the Gulf Coast States prior to Katrina's landfall.

Substandard Decisions:

- The White House failed to deconflict varying damage assessments and discounted information that ultimately proved accurate.
- On the other hand, the President did not leave his Texas ranch to return to Washington until two days after landfall, and only then convened his Cabinet, as well as a White House task force, to oversee federal response efforts.
- Throughout Monday, the day of the storm, the President maintained his regular schedule. In the morning, he celebrated Senator John McCain's birthday at Luke Air Force Base near Phoenix, Arizona. He also spoke to the people in the Gulf Coast region, offering that, "When the storm passes, the federal government has got assets and resources that we will be deploying to help you.
- Despite these reports of a catastrophe, the White House failed to grasp the gravity of the situation as it unfolded. As a result, the White House's initial response appeared halting and inadequate.

Federal

Responsibilities:

- When effective response is beyond the capabilities of the state and the affected local governments, the Stafford Act provides for federal assistance upon the request of the state and local governments.
- Federal departments and agencies were required to develop supporting operational plans and standard operating procedures (SOPs) to integrate their activities into the national response. In almost all cases, the integrating SOPs were either nonexistent or still under development when Hurricane Katrina hit.
- The Federal Government had the Authority to Assist with Pre-Landfall Evacuation, Even in the Absence of a Request for Assistance from State and Local Governments.

Substandard Actions:

- The Federal government did not reach out to state or local authorities about transportation alternatives for those lacking means for prelandfall evacuation.
- Lack of coordination at the Federal headquarters level reflected confusing organizational structures in the field.
- The lack of communications and situational awareness had a debilitating effect on the Federal response. Even after coordinating elements were in place, Federal departments and agencies continued to have difficulty adapting their standard procedures to this catastrophic incident.
- The Federal response suffered from significant organization

and coordination problems during this week of crisis.

- The Federal government's problems responding to Hurricane Katrina illustrate greater systemic weaknesses inherent in our current national preparedness system: the lack of expertise in the areas of response, recovery, and reconstruction.

Homeland Security

Responsibilities:

- Homeland Security takes the lead in coordinating the response to provide supplies, help with cleanup, and provide aid to those whose homes are destroyed.

Gaps:

- Our current system for homeland security does not provide the necessary framework to manage the challenges posed by twenty-first-century catastrophic threats.

Failures:

- The Homeland Security Operations Center failed to provide valuable situational information to the White House and key operational officials during the disaster.

- Command centers in the Department of Homeland Security (DHS) and elsewhere in the Federal government had unclear, and often overlapping, roles and responsibilities that were exposed as flawed during this disaster.

Department of Homeland Security (DHS)

Statutory authorities and presidential directives establish the Department of Homeland Security (DHS) as the central federal entity for preparedness for and response to disasters.

Responsibilities:
Authorities invested DHS with at least four categories of responsibility:

1. Leadership.
   a. The Secretary of the Department of Homeland Security has clear duties to lead and manage the federal response to disasters such as Katrina.
   b. He carries ultimate responsibility for managing FEMA and other DHS components and is charged with coordinating overall federal operations.
   c. The Secretary must marshal federal resources, decide whether to appoint a Principal Federal Official to lead the federal response on the ground, and decide whether to implement the Catastrophic Incident Annex, which provides for an accelerated, proactive national response to a catastrophic incident.
2. Coordination and Support.
   a. DHS can use various structures and resources to coordinate and support the overall response effort.
   b. Recommendations to the Secretary, who has the power to activate the IIMG based on the nature, severity, magnitude, and complexity of a threat or incident.
3. Operational Responsibilities.
   a. DHS has significant, ground-level operational responsibilities in responding to disasters.
   b. DHS and its component agencies are primary or coordinating agencies for nine of the 15 Emergency Support Functions (ESFs) in the NRP—categories of federal capabilities that can be brought to bear to provide support in domestic incidents—including public safety and security, communications support, and emergency management.
   c. DHS components such as the Coast Guard also have significant missions and statutory responsibilities independent of the NRP.
4. Preparedness.
   a. Besides its response roles, DHS has primary responsibility for strengthening national preparedness—including the planning, training, and equipment necessary to prevent, respond to, and recover from major domestic incidents—under HSPD-8 and the Homeland Security Act.
   b. Section 502 of the Homeland Security Act gives the Secretary, acting through the FEMA Director, responsibility for "helping to ensure the effectiveness of emergency response providers to terrorist attacks, major disasters, and other emergencies."
   c. The Department has authority over primary grants and training programs for state and local first responders and emergency managers. Pursuant to HSPD-8, DHS has developed a National Preparedness Goal, establishing national emergency-management and preparedness priorities.
   d. DHS ties its preparedness requirements to grant funding, requiring that all states submit emergency plans in order to get funding and that the money be used to meet the capabilities and priorities set forth by the National Preparedness Goal.
5. DHS has assumed responsibilities under the Robert T. Stafford Relief and Emergency Assistance Act (Stafford Act). Stafford Act authorizes and provides the administrative mechanisms for the federal government to assist state and local governments in disasters.
6. DHS was created to bring together multiple, disparate agencies to create synergy and ensure a coordinated approach to preventing, preparing for, and responding to catastrophes, whether caused by terrorism or nature.

Failures:

- DHS leaders failed to bring a sense of urgency to the federal government's preparation for Hurricane Katrina.
- DHS did not fully adapt or adequately train to meet its obligations under the NRP before Hurricane Katrina.
- Nor did the Department address the known deficiencies of FEMA, such as staffing shortages, inadequate training, poor commodities tracking, and insufficient plans for post-disaster communications.
- In the critical days before landfall, DHS leadership mostly watched from the sidelines, allowed FEMA to take the lead, and missed critical opportunities to help prepare the entire federal government for the response.
- The Department of Homeland Security (DHS), which is charged with preparing for and responding to domestic incidents, whether terrorist attacks or natural disasters, failed to lead an effective federal response to Hurricane Katrina.
- DHS was slow to recognize the scope of the disaster or that FEMA had become overwhelmed.
- DHS—as the Department charged with preparing for and responding to domestic incidents, whether terrorist attacks or natural disasters—failed to effectively lead the federal response to Hurricane Katrina.
- DHS and its leaders failed to prepare the nation adequately for the unprecedented devastation of Hurricane Katrina.
- DHS leadership failed to bring a sense of urgency to the federal government's preparation for Hurricane Katrina, and Secretary Chertoff himself should have been more engaged in preparations over the weekend before landfall.

Secretary of Homeland Security

Responsibilities:

- The Secretary of Homeland Security, is the President's principal Federal official for domestic incident management, but he had difficulty coordinating the disparate activities of Federal departments and agencies.
- The Secretary of Homeland Security has a clear duty to lead and manage the federal response to disasters such as Katrina.
- The Secretary should have invoked the Catastrophic Incident Annex to direct the federal response posture to fully switch from a reactive to proactive mode of operations. Absent the Secretary's invocation of the Catastrophic Incident Annex, the federal response evolved into a push system over several days.

- During actual or potential Incidents of National Significance, the overall coordination of federal incident management activities is executed through the Secretary of Homeland Security.
- It also made the Secretary responsible for developing and administering the National Response Plan (NRP) and the National Incident Management System (NIMS)
- decisions made by DHS leadership weakened FEMA and impeded its ability to respond to disasters.

Substandard Decisions:

- Secretary Chertoff failed to appoint a Principal Federal Official (PFO), the official charged with overseeing the federal response under the NRP, until 3 hours after landfall.
- Secretary Chertoff failed to make ready the full range of federal assets pursuant to DHS's responsibilities under the National Response Plan (NRP).
- With local and state resources immediately overwhelmed, rapid federal mobilization of resources was critical. Yet reliable information on such vital developments as the levee failures, the extent of flooding, and the presence of thousands of people in need of life-sustaining assistance at the New Orleans Convention Center did not reach the White House, Secretary Chertoff , or other key officials for hours, and in some cases more than a day
- Secretary Chertoff made only top-level inquiries into the state of preparations, and accepted uncritically the reassurances he received.
- He did not appear to reach out to the other Cabinet secretaries to make sure that they were readying their departments to provide whatever assistance DHS—and the people of the Gulf Coast—might need.
- Similarly, had he invoked the Catastrophic Incident Annex of the National Response Plan (NRP-CIA), Secretary Chertoff could have helped remove uncertainty about the federal government's need and authority to take initiative before landfall and signaled that all federal government agencies were expected to think—and act—proactively in preparing for and responding to Katrina.

Failures:

- The Secretary lacked real-time, accurate situational awareness of both the facts from the disaster area as well as the on-going response activities of the Federal, State, and local players.

FEMA

Responsibilities:

- FEMA has responsibilities in both disaster response and recovery.
- Response includes actions taken during or after an emergency.
- Recovery involves short-term activities to return life-support systems after an emergency—such as rebuilding and assisting victims in dealing with damage caused by a disaster.
- Once the 17th Street Canal levee had been breached and the city was overwhelmed it was FEMA's responsibility to step in.

Substandard Decisions:

- FEMA's former Director, Michael Brown, lacked the leadership skills that were needed. Before landfall, Brown did not direct the adequate pre-positioning of critical personnel and equipment, and will fully failed to communicate with DHS Secretary, Michael Chertoff, to whom he was supposed to report.
- Brown and most of his front-office staff had little or no emergency-management experience prior to joining FEMA.
- Brown, then in Louisiana, contributed to the problem by refusing to communicate with Secretary Chertoff, opting instead to pass information directly to White House staff.
- Brown sent a single employee, without operational expertise or equipment and from the New England region to New Orleans before landfall.
- the leadership at the time of Katrina also lacked basic management experience and the leadership ability required to coordinate the entire federal government's response to a catastrophic event.
- circumvented his chain of command and failed to communicate critical information to the Secretary
- failed to deliver on commitments made to Louisiana's leaders for buses
- travelled to Baton Rouge with FEMA public-affairs and congressional-relations employees and a personal aide, and no operational experts
- failed to adequately carry out responsibilities as FEMA's lead official in the Gulf before landfall and when he was appointed as the Principal Federal Official after landfall.

Failures:

- FEMA failed to adequately develop emergency-response capabilities assigned to it under the National Response Plan.
- FEMA's senior political appointees, including Director Michael Brown and Deputy Director Patrick Rhode, had little or no prior relevant emergency-management experience before joining FEMA.
- FEMA was unprepared for a catastrophic event of the scale of Katrina.
- FEMA lacked the tools to track the status of shipments, interfering with the management of supplying food, water, ice, and other vital commodities to those in need across the Gulf Coast.
- Michael Brown, FEMA's Director, was insubordinate, unqualified, and counterproductive
- failed to organize FEMA's or other federal eff orts in any meaningful way.
- FEMA had budget shortages that hindered its preparedness.
- FEMA's emergency-response teams were inadequately trained, exercised, and equipped.
- Prior to Katrina's landfall, FEMA suffered from a number of problems: unqualified senior political leadership, budget shortages, personnel shortages, and inadequate response capabilities.
- FEMA tried to get additional funding from DHS, but the requests were generally denied
- Over the last few years, FEMA has operated with a 15 to 20 percent vacancy rate; many positions cannot be filled because of budget shortages
- FEMA is a small agency with approximately 2,500 permanent full-time employees. Over the last few years, FEMA has suffered numerous personnel problems, hindering its ability to prepare for and respond to a catastrophic event.
- The ability of FEMA to respond to a natural disaster of this magnitude had not been tested under the Bush Administration.

National Response Plan (NRP)

- National Response Plan released in December of 2004.
- The NRP further confirms DHS's central role in disaster preparedness and response.
- The National Response Plan (NRP) was intended to form the basis of the federal government's response to disasters and for its interaction with state and local governments during such events.
- One main element of the National Preparedness System is the National Response Plan (NRP).

Failures:

- Under the current response framework, the Federal government merely "coordinates" resources to meet the needs of local and State governments based upon their requests for assistance.
- This lack of understanding of the "National" plan not surprisingly resulted in ineffective coordination of the Federal, State, and local response.
- the response to Katrina did not go as planned is that The NRP was relatively new to many at the Federal, State, and

local levels before the events of Hurricane Katrina.
- The Emergency Support Functions (ESFs) did not function as envisioned in the NRP.
- The National Response Plan's Mission Assignment process proved to be far too bureaucratic to support the response to a catastrophe.
- in that it clearly defines the roles and interagency responsibilities for the management of all disasters as deemed by DHS to be incidents of national significance.
- This framework does not address the conditions of a catastrophic event with large scale competing needs, insufficient resources, and the absence of functioning local governments.
- Consequently, some of the specific procedures and processes of the NRP were not properly implemented, and Federal partners had to operate without any prescribed guidelines or chains of command.

Gov. Kathleen Blanco

Correct Decisions:
- On August 26, 2005, Governor Blanco declared a state of emergency in order to initiate the pre-positioning of Federal commodities at Federal Operations Staging Areas (FOSA's).
- Once Governor Blanco declared a state of emergency FEMA Logistics pre-positioned commodities such as ice, water and Meals Ready to Eat (MREs) at the closest FOSAs.

Substandard Decisions:
- Governor Blanco Did Not Request Transportation Resources From the Federal Government for Pre-landfall Evacuation.
- Gov. Kathleen Blanco was aware that she needed help but due to lack of constant communication and competency in dealing with disasters, did not know what to ask for.
- New Orleans Mayor Ray Nagin and Louisiana Governor Kathleen Blanco—who knew the limitations of their resources to address a catastrophe—did not specify those needs adequately to the federal government before landfall. For example, while Governor Blanco stated in a letter to President Bush, two days before landfall, that she anticipated the resources of the state would be overwhelmed, she made no specific request for assistance in evacuating the known tens of thousands of people without means of transportation, and a senior State official identified no unmet needs in response to a federal offer of assistance the following day.

The Mayor

Responsibilities:
- the Mayor, who was supposed to be in charge of the emergency operations, was rarely seen in the EOC.

Substandard Decisions:
- Delayed mandatory Evacuation order
- had used the Superdome twice prior to Hurricane Katrina as a shelter of last resort. The first time, during Hurricane Georges it turned out to be a disaster and the second time, During Hurricane Ivan it proved to be better organized. Unfortunately, its use during Hurricane Katrina fared not so well once again.
- On August 28, 2005 Mayor Nagin made evacuation of the city mandatory.

Failures and Key Findings

Findings:
- The storm demonstrated the need for greater integration and synchronization of preparedness efforts, not only throughout the Federal government, but also with the State and local governments and the private and non-profit sectors as well.
- Following a catastrophic disaster, the traditional mode of operation may not work if state and local governments are so overwhelmed that they can't effectively make specific requests for assistance. In such circumstances the National Response Plan's Catastrophic Incident Annex provides for a more proactive federal response.
- Under our system of federalism, state and local governments bear the primary responsibility for responding to emergencies. As such, they generally manage the response to an incident in the first instance.
- Four overarching factors contributed to the failures of Hurricane Katrina:
  - long-term warnings went unheeded and government officials neglected their duties to prepare for a forewarned catastrophe
  - government officials took insufficient actions or made poor decisions in the days immediately before and after landfall
  - systems on which officials relied to support their response eff orts failed, and
  - Government officials at all levels failed to provide effective leadership.
- Many Residents Disregarded the Mandatory Evacuation Orders Due to Complacency, Poor Evacuation Experiences, and Insufficient Financial Resources to Support Themselves and Their Families on the Road.
- The Director of the City of New Orleans Office of Emergency Preparedness Turned Down Offers of Assistance With the Pre-landfall Evacuation From the Regional Transit Authority (RTA).

Failures:
- The City of New Orleans Failed to Prepare a Draft Mandatory Evacuation Order Before Katrina Approached the Gulf Coast
- Ineffective execution of the National Response Plan.
- An under-trained and under-staffed Federal Emergency Management Agency.
- A Catastrophic Incident Annex that was never invoked, and doubt that it would have done the job anyway.
- A perplexing inability to learn from Hurricane Pam and other exercises.
- Levees not built to withstand the most severe hurricanes.
- An incomplete evacuation that led to deaths and tremendous suffering.
- A complete breakdown in communications that paralysed command and control and made situational awareness murky at best.
- The failure of state and local officials to maintain law and order.
- Haphazard and incomplete emergency shelter and housing plans.
- An overwhelmed FEMA logistics and contracting system that could not support the effective provision of urgently needed supplies.
- The readiness of FEMA's national emergency response teams was inadequate and reduced the effectiveness of the federal response.
- DHS and FEMA lacked adequate trained and experienced staff for the Katrina response.
- Federal agencies, including DHS, had varying degrees of unfamiliarity with their roles and responsibilities under the National Response Plan and National Incident Management System.
- FEMA was unprepared—and has never been prepared—for a catastrophic event of the scale of Katrina.
- The Committee's investigation found systemic and leadership failures, displayed in both the preparation for and response to Hurricane Katrina, at both the Department of Homeland Security (DHS) and FEMA.
- The Homeland Security Operations Center (HSOC)—charged with providing reliable information to decision makers including the Secretary of DHS and the President—failed to create a system to identify and acquire all available, relevant information, and as a result situational awareness was deeply flawed.
- Long-term and short-term warnings went unheeded
- The Committee believes that leadership failures needlessly compounded these losses.

- Lack of coordination at the Federal headquarters-level reflected confusing organizational structures in the field.
- The Federal government's problems responding to Hurricane Katrina illustrate greater systemic weaknesses inherent in our current national preparedness system: the lack of expertise in the areas of response, recovery, and reconstruction. Insufficient planning, training, and interagency coordination are not problems that began and ended with Hurricane Katrina. The storm demonstrated the need for greater integration and synchronization of preparedness efforts, not only throughout the Federal government, but also with the State and local governments and the private and non-profit sectors as well
- Our current system for homeland security does not provide the necessary framework to manage the challenges posed by 21st Century catastrophic threats.
- The Federal response suffered from significant organization and coordination problems during this week of crisis.
- The lack of communications and situational awareness had a debilitating effect on the Federal response. Even after coordinating elements were in place, Federal departments and agencies continued to have difficulty adapting their standard procedures to this catastrophic incident

6. CONCLUSION

The report highlighted using a case study on how decisions are made. Most of the time, gaps in decisions are made clearer after a disaster.

The case study highlighted the fact that from the highest ranking officer to the lowest ranking officer who were involved with decision making, they failed to carry out the most important aspect of decision making during disasters, saving lives. There were breakdowns in the chain of command in all areas from evacuation planning to communication and sheltering to transport. I agree that it is not easy to find solutions to every disaster, but people at responsible places must carry out their duties or should get the required guidance and training.

The laws of the country should be followed for an incident. In the United States, the following four are referred to as relevant for this incident.

- Title VI of the Stafford Act also places significant responsibilities for national emergency preparedness on the FEMA Director and, through the Homeland Security Act, on DHS, providing, among other things, that the federal government is to provide the necessary direction, guidance, and assistance "so that a comprehensive preparedness system exists for all hazards."
- Homeland Security Presidential Directive 8 (HSPD-8) issued on December 17, 2003, further designated the Secretary as "the principal Federal official for coordinating the implementation of all-hazards preparedness in the United States."
- Homeland Security Presidential Directive 5 (HSPD-5), issued by President Bush on February 28, 2003, formally designated the Secretary of Homeland Security as the "principal federal official for domestic incident management."
- The Homeland Security Act of 2002 established the Department and provides that one of DHS's missions is "acting as a focal point regarding natural and manmade crises and emergency planning."

All the other responsibilities are aligned under these statutory regulations. As shown in the case study, the main failures were not following the standards that were adopted by the States.

"As we are all aware, disasters are very political events," said FEMA Director James Lee Witt. (Sobel & Leeson, 2006). Decision making varies according to many factors. In 2005, Hyogo Framework for Action 2005–2015 (HFA) was formulated to provide the following strategies, three strategic goals: to integrate disaster risk reduction into sustainable development policies and planning; to develop and strengthen institutions, mechanisms, and capacities to build resilience to hazards; and to systematically incorporate risk reduction approaches into the implementation of emergency preparedness, response, and recovery programs (United Nations, 2008).

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