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COMPARATIVE ANALYSIS OF IMMEDIATE RESPONSE BY NATIONAL DISASTER MANAGEMENT SYSTEMS OF THE U.S., PAKISTAN, AND TURKEY

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June 2014**

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DISASTER MANAGEMENT SYSTEMS OF THE U.S., PAKISTAN, AND
TURKEY**

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COMPARATIVE ANALYSIS OF IMMEDIATE RESPONSE BY NATIONAL DISASTER-MANAGEMENT SYSTEMS OF U.S., PAKISTAN, AND TURKEY

ABSTRACT

Pakistan and Turkey are located in natural disaster-prone regions. The frequency of occurrence is high with varying magnitudes. These natural disasters often lead to a multitude of losses. The overall impact of natural disasters on these countries is significant, and for specific disaster-hit areas, it becomes enormous. The Van earthquake in Turkey in 2011 and the floods of Pakistan in 2010 are two exemplary cases, showing all the catastrophic effects of a large-scale natural disaster. Systems are in place for disaster management at the national level both in Turkey and Pakistan; however, the response often falls short in terms of speed and quality, thereby failing to provide requisite immediate relief to those affected. To some extent, the response strategies in the Van earthquake and floods in Pakistan could not meet the ideal emergency response criteria for the national management of these particular disasters.

The purpose of this project is to study the efficacy of natural disaster management systems in Pakistan and Turkey in the cases of the Pakistan floods and Van earthquake. We take the relatively mature and developed system followed in the U.S. during and after Hurricane Irene as a baseline for the assessments and comparisons. Results and comparisons will help identify the shortcomings in natural disaster-management systems of Pakistan, Turkey, and the U.S., and will provide insight for a more effective disaster management system.

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LIST OF ACRONYMS AND ABBREVIATIONS

Admin	Administration
AFAD	Prime Ministry Disaster and Emergency Management Presidency
DDMA	District Disaster Management Authority
DRM	Disaster Risk Management
ERC	Emergency Relief Cell
FEMA	Fardel Emergency Management Agency
FFC	Federal Flood Commission
GFDRR	Global Facility for Disaster Reduction and Recovery
GOP	Government of Pakistan
ICLR	Institute of Catastrophic Loss Reduction
INGO	International Non-Governmental organization
KPK	Khyber Pakhtoon Khawa
NCDC	National Climatic Data Center
NDMA	National Disaster Management Authority
NDMC	National Disaster Management Commission
NDRP	National Disaster Response Plan
NEMA	National Emergency Management Association
NGO	Non-Governmental organization
NHC	National Hurricane Center
NOAA	National Oceanic and Atmospheric Administration
PDMA	Provincial Disaster Management Authority
PDMC	Provincial Disaster Management Commission
S&S	Support and Services
TRCS	Turkish Red Crescent Society
UNDHA	United Nations Department for Humanitarian Affairs
UNDP	United Nations Development Program
UNDRO	United Nations Disaster Relief Organization
UNOCHA	United Nations Office for Coordination of Humanitarian Affairs

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I. INTRODUCTION

A. BACKGROUND

Throughout history, people have been striving to understand the reasons for and to mitigate the impacts of natural disasters. Due to their unpredictability, natural disasters have affected the lives of humans significantly. Since it is still a very difficult task to predict nature and estimate the location as well as the magnitude of natural disasters, societies attempt to aggregate their efforts to lessen the initial impact and post-disaster needs. Even though the approaches or methodology differ from one to another, all societies have the same goals to address *disaster management*.

Disaster management concepts show variances in the execution phase. This differentiation results from several factors such as political, cultural, economic, or capacity of available resources, as well as the efficacy of the organizational structure that is responsible for the disaster-management process. All these factors are highly correlated to the success and efficacy of the disaster-management process.

Despite modern information technology and sophisticated planning processes, still no nation is capable of manipulating the causes of natural disasters, nor is any nation fully immune from disasters' devastating impacts. The capabilities of nations are very limited when attempting to prevent the occurrence of natural disasters. To maximize the utilization of tools and resources that nations have, disaster management focuses on effective planning and strategy, both of which start in the rational decision-making process of a well-established and mature disaster management organization. A cohesive organizational structure is vital for effective disaster management, because it is a bridge between the plans and documentation done in the preparation phase, and the response executed just after the incident. Any kind of possible discrepancy or inadequacy is the direct manifestation of a weak organizational process. In that sense, this research aims to study disaster-management systems of three different countries and their efficacy during particular cases in order for authors to reach a conclusion and related recommendations regarding the needs for improvement, adjustment, and adaptation. Figure 1 shows the

four axes of disaster management cycle composed of prevention, mitigation, response, and recovery. The study mainly focuses of the response phase that is determined by the interaction among the other three axes.

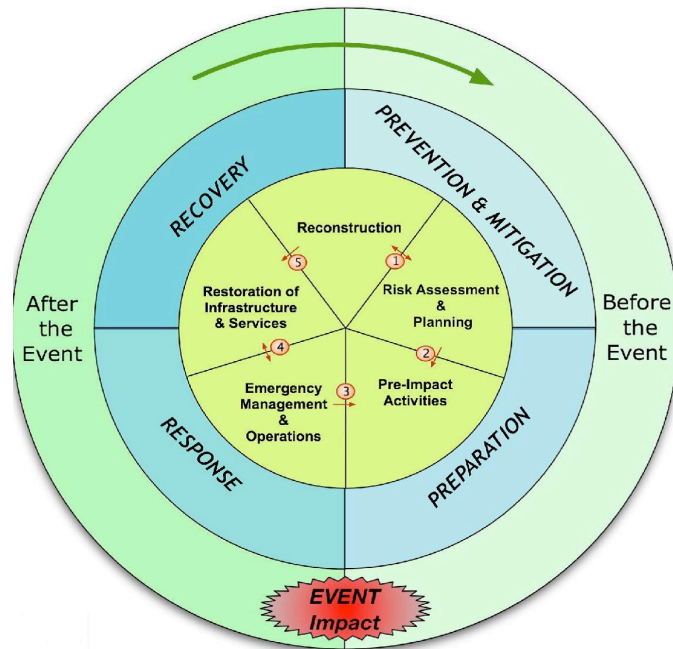


Figure 1. Phases of Disaster Management (from Vanneuville et al. 2011)

B. PURPOSE

The purpose of this project is to study the efficacy of natural disaster management systems in the U.S., Pakistan, and Turkey, with special emphasis on lead disaster-management agencies at the national level. This research will also analyze the structural aspects and processes being followed to make recommendations for improving existing natural disaster-management systems. Results and comparisons will help identify the shortcomings in natural disaster-management systems of Pakistan, Turkey, and the U.S., and will provide insight for a better optimized, and more effective, disaster-management system.

C. RESEARCH QUESTION

To conduct this study, we will answer the following research questions:

- How have natural disaster management organizations evolved in the U.S., Turkey, and Pakistan; and what are the similarities between respective strategies/procedures for immediate response to major natural disasters?
- How was the immediate response to a major natural disaster of Federal Emergency Management Agency (FEMA), Prime Ministry Disaster and Emergency Management Presidency (AFAD), and National Disaster Management Authority (NDMA) in the U.S., Turkey, and Pakistan, respectively?
- What are the strengths and weakness of FEMA, AFAD, and NDMA in providing immediate disaster management response?
- Are there any measures required for improvement of immediate natural disaster-management response by FEMA, AFAD, and NDMA?

D. OBJECTIVE

This study focuses on the efficacy of natural disaster-management systems of the U.S., Pakistan, and Turkey during specific disasters. Granted that there are many aspects of the natural disaster-management process; however, this research intends to limit its analyses to the organizational development and evolution of the natural disaster-management systems of the U.S., Turkey, and Pakistan.

1. Scope

The research carries out the analyses to identify the similarities and differences between respective strategies/procedures during relief operations in general, as well as during specific cases. It will focus on optimizing the organizational effectiveness of the U.S., Turkey, and Pakistan in specific cases by detecting the structural strengths and weaknesses of their disaster-management systems.

2. Benefits of the Study

The primary benefit of this study is to focus on the difficulty of maintaining the match and harmony between disaster-management strategies and plans, as well as the response during the incident. It is reasonable to assume that strategies and plans oftentimes seem sufficient if the analytic reasoning and fit between strategies and plans are sustained. However, the execution of these pre-disaster prepared documents generally shows some degree of variation from the expected outcomes. Moreover, these variations might occur due to many factors that are not always significantly correlated to each other. This research will focus on the organizational factors that can dramatically affect the outcomes of a natural disaster, as well as the success of relief operations executed during the response phase.

The secondary benefit is our analysis highlights the importance of a comprehensive disaster-management structure that meets the requirements of different kinds of natural disasters, rather than specializing uniquely on particular types. Actually, this requirement is the corollary of the unpredictability of natural disaster, in that all countries should be prepared and capable of managing the urgent needs of the response phase that takes place just after the disaster. This research studies three major natural disaster types in three different countries in three different time frames and environments. The results of this analysis are the strongest advocates of the primary benefits of this research, which intends to optimize the problematic areas of the sample countries' disaster-management systems.

E. ORGANIZATION AND METHODOLOGY OF THE STUDY

This research is composed of four main chapters. In the literature review chapter (Chapter II), the research provides background information about the definitions, causes and effects of natural disasters, and presents the evolution of the disaster-management concept in the world. Moreover, the literature review clarifies the evolution of natural the disaster-management structure of the U.S., Turkey, and Pakistan in the light of official sources and academic articles.

In this chapter, the research discusses disaster-management process and its functioning during Hurricane Irene, the floods of 2010, and the Van Earthquake, which occurred in the U.S., Pakistan, and Turkey, respectively. In addition, the research aims to focus on the organizational structure of disaster-management systems, national disaster-management strategies, and plans of these countries in light of the practices and activities demonstrated during the specific cases.

In the analysis chapter (Chapter III), we focus on the evolution of the disaster-management systems profiled in the three countries. This is followed by an analysis of the differences in structures and resultant effects on their operations. Finally, we see the problems related to the conduct of disaster management during specific cases to identify possible causes.

In Chapter IV, we restate the results of Chapter III, and identify the strengths and weaknesses of current organizational structures of disaster-management systems. This chapter includes analyses of the response of these structures to specific natural disasters. Chapter V follows with recommendations for improving the effectiveness of disaster-management systems of the analyzed countries, and Chapter VI offers conclusions and considerations for nations worldwide.

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II. LITERATURE REVIEW

A. BACKGROUND

The research on natural disasters has a very broad spectrum that ranges from technical and engineering issues to social and organizational perspectives that are mostly related to administrative performance of the state institutions and particular nongovernmental organizations (NGOs). Likewise, there are various literatures intended for explaining these different dimensions of the issue. Bearing the same intentions, in this chapter we will review the general definitions, causes, and effects of natural disasters. Subsequently, we will examine the evolutionary development of natural disaster management organizations of the U.S., Turkey, and Pakistan in order to ripen the study for Chapter III, where we will discuss the efficacy of these countries' organizations in specific cases.

1. Causes and Effects of Natural Disasters

Natural disasters stem from nature-based destructive events that give damage to people and economies. However, there is an insignificant correlation between the cause of the extreme events and outcomes of the disasters. In other words, the causal relationship between extreme and high stake events and the destructive outcomes of natural disasters do not have a strong correlation factor. That is why scientists assert that disasters might also result from minor natural events, and sequences of subsequent events, which often intersect with the human factor as a catalyst (Dovers and Handmer 2007). The human factor constitutes one of the most crucial co-factors of natural disasters. For example, settlements in hazardous areas, the incremental increase in contamination and pollution, construction of unsafe structures in flood-prone areas, adverse effects of income gap and poverty, poor education, and insufficient information technology are among these factors. It is important to highlight the implicit point that these factors are actually the historical roots of all major catastrophic disasters in the world. Another important point is the variety and complexity of the intermingled factors stated here. These nonlinear factors require a complex and strong cooperation of different

sciences such as sociology, communication, logistics, politics, strategic management, and organizational behavior. These sciences attempt to uncover underlying causes of inherent vulnerability of disasters in addition to the efforts for better and optimal solutions for prevention and response.

Another factor that makes the cause and effect relationship unpredictable is the ambiguity and inconsistency of the disasters themselves. Sometimes it can be easy to observe the causes of disasters, as it was in the Chelyabinsk area of Russia (Monroe 1992). However, in contrast to the human-caused disasters, the nature-based disasters are hard to recognize and define before they occur. For example, scientists are still debating the reasons for Hurricane Katrina. While some of them claim that climate change, contamination, ozone depletion, and biodiversity loss are major factors, others believe that the real causes for the hurricane are not obvious, despite the strong claims about climate change (Steffen et.al 2004).

The most common belief about the causes of disasters is the increasing number of climate extremes resulting from the climate change. Definitely, this is a major factor, but not a single factor. According to the Intergovernmental Panel on Climate Change's (IPCC) Special Report on Extremes and Managing Disasters (United Nations 2012), the factors can be classified as follows:¹

- Hazard: This term stands for the increasing frequency of climatic extremes around the globe. IPCC claims that the major factor for the hazards result from global warming (United Nations 2007). The melting down of the glaciers and the increasing average heat of seasons cause warmer winters, fewer frosts, and changed rainfall patterns, which together damage biodiversity. This claim has many proponents in academic and public opinion. However, there are also strong arguments stating that global warming is a naturally occurring cycle, and its long-term benefits will be much more significant than its short- or long-term ones or its costs; in that, the drought areas in the world will affect agriculture due to the increased sea level (Mendelsohn, Nordhaus and Shaw 1994). Moreover, they state the catastrophic outcomes of global warming will never be experienced because of the balancing natural movements and cycles in the atmosphere and tectonic crust of the world (Van der Ploeg and Withagen 2012).

¹ The terms used here might seem a replica of definitions. However, the causal relationship between the terms and natural disasters is the main point that the authors want to state in this part. See "Definitions" section which follows this part for universal meanings of the terms.

- Exposure: This term refers to the increasing population, especially in the poorer areas. The income gap and differences in standards of living have become wider. Despite this, the relationship between income and population is negatively correlated, that is, the richer the country, the slower its increase in population. For this reason, those most affected by natural disasters are disproportionately poor people who generally live in previously vacant areas (previously left vacant because of the risk of flood, landslides, earthquake zones, and industrial pollution) (Dovers and Handmer 2012).
- Vulnerabilities:
 - Urbanization: Large cities have turned into mega-cities by virtue of industry and business amenities in these areas; however, these urbanized locations have actually transformed into a convergence center for masses of people and their never-ending activities. Thus, overloaded transportation systems, overused resources of the cities, and accumulated waste of humans and their activities precipitate the emergence of disasters. This situation is often explained as environmental degradation (Stiglitz 2003).
 - Socioeconomic Factors: As stated in the previous paragraphs, the increasing abyss among the wealth of people and countries results in the imbalanced use of natural resources. This factor, in fact, can be more pertinent to the causes of human-related disasters rather than natural disasters (Evans and Ashley 2004) because natural disasters are more unpredictable and mostly follow similar historical patterns, which have weak correlation with the industrial development cycle of the world.
 - Wars and Civil Strife: These factors mostly stand for the destructive effects of natural disaster rather than the causes. These factors cause the mass mobilization and displacement of people. These masses generally concentrate in specific areas that are called refugee zones or districts. Due to the lack of transportation and proper infrastructure in these areas, the effects of potential natural disasters are often dramatic in these areas. The unstable social and political situation, the ongoing military interventions, and use of destructive weapons hinder the efforts of both official agencies and NGOs (Levy and Sidel 1997). In short, in case of a natural disaster these people are left to their own destiny due to the impossibilities resulting from the unsafe environment.

2. Definitions

The following terms, all of which will be used throughout the study, are the universal definitions for the disaster management domain.

Hazard

Hazard is defined by events or physical conditions that have the potential for causing injuries, fatalities, property and/or infrastructure damage, agricultural and/or industrial damage, harm to daily business life, damage to environment, and other types of harm and loss (FEMA 1997). Moreover, this study will refer to *natural hazards*, even though there are two more major types of hazards, such as *technological hazards* and *intentional hazards* (Akdag 2002).

Risk

Risk is used to symbolize the likelihood of an unwanted possibility; that is why this study will refer to risk as the destructive damage of a natural disaster. It is reasonable to think of hazard as a dependent value of risk and vulnerability, which are independent variables to determine whether a hazard is a result of a disaster. In addition to defining the outcomes as *consequences*, the probability of a disaster occurring can be defined as *likelihood*. Thus, risk can be stated as the product of consequence and likelihood (RISK = LIKELIHOOD x CONSEQUENCE) (Ansell and Wharton 1992).

Vulnerability

Vulnerability represents the inclination of an object, individual, group, area, community, and country to incur the consequences of a hazard (Coppola 2006). Implementing strong policies that consider the requirements of an effective disaster-management strategy can mitigate these deficiencies. Since the consequences of a disaster might vary due to its co-factors, the vulnerability also differs from one location to another, as well as from one country to another. Therefore, in order for international efforts to yield effective and standard outcomes in disaster-management response, the agenda setting and policy-making phases should be accurately designated, which will minimize the margin of error in the variations of vulnerability in all cases for all countries (Kaya and Sahin 2013).

Disaster

Disaster is the realization of the risk factor of the hazard. In other words, each event has some potential of damage, and damage varies by magnitude of hazard that has the risk of resulting in a disaster. As stated earlier, the risk is the probability of an unwanted event that can also be called hazard. Here emerges the critical point that not every event means disaster; rather, only the ones that overwhelm the response capacity and affect the vulnerability of a country are considered disasters. To put it simply, the UN defines a disaster as “a serious disruption of functioning of a society, causing widespread human, material, or environmental losses, which exceed the ability of the affected society to cope using only its own resources” (UNDHA 1992).

Safe

Safe stands for the threshold that can bear the devastating effects of the risk up to some point. Since completely risk-free environments cannot exist in the real world, assigning a safety point and designing a management system whose reliability matches with that safety point will help countries use their available resources with maximum efficiency. Derby and Keeney (1981) emphasize that a safety level is only admissible if it associates with the best of available alternatives, not with the best of the alternatives that one would hope to have (Kadioglu 2011).

Combined Disaster

Compound disaster stands for the snowball effect of hazardous events which holds true for most natural disasters. Namely, one primary disaster might cause a secondary hazard, or a prior low-hazardous event might cause a subsequent devastating disaster. The readiness level of the disaster management plans should encompass these uncertainties that can exponentially aggravate the outcomes of disaster cases (Coppola 2006).

Humanitarian Crisis

Humanitarian crisis is the situation that stems from the combination of destruction after a disaster and the failure or insufficiency of a current disaster-management system in the affected location. The outcome often results in the form of starvation, disease, insecurity, exposure, and incremental growth in the number of victims (Coppola 2006).

Refugees and Internally Displaced People

When one is *forced* to leave his country due to wars or internal strife, then this person is referred to as *forced migrant*. The distinction between a refugee and an internally displaced person comes up here. The first one represents a person who is able to leave his country during the turmoil, while the latter describes one who is unable or unwilling to leave his country. The prior one has many protections and subsidies from the international arena, as well as the host country, while the second one has very little physical protection and is often faced with food, water, and provisions shortages (Goodwin and McAdam 1996).

3. History of Major Disasters in Turkey, Pakistan, and the U.S.

All three countries have experienced natural disasters of various magnitudes and impact levels throughout their history. Some of these disasters caused significant damage and destruction. This section summarizes the most notable ones regarding these three countries.

a. Turkey

From an historical standpoint, Turkey has had many disasters, some of which included major destructive consequences for the country. Beginning with the Turkish Republic in 1923, Turkey experienced one of its greatest catastrophes—the Erzincan Earthquake in 1939—which resulted in over 30,000 deaths and more than 100,000 heavily damaged or destroyed buildings. Soon after this disaster, the Turkish government took some serious actions such as tax cancellations and compensation payments for those affected. But the most important regulation made by the government was to set quality standards for construction materials.

In the early 1940s, Turkey struggled with many concurrent floods in different regions. Countless agricultural lands and grazing fields were ruined due to the landslides and avalanches caused by deluges. These put heavy burdens on the economy that was already hurt by WWII. Between 1945 and 1999, Turkey experienced many minor disaster events that did not affect the social and economic life as much.

The Marmara Earthquakes in 1999 were the most destructive disasters in Turkey's history. The main reason for the catastrophic outcomes was that the affected areas were critical locations of business and social life with large populations and heavy industry. This disaster was the milestone in Turkish history that focused on the modernization of the disaster-management domain (AFAD 2013a).

In 2011, the Van Earthquake, while not as destructive as previous ones, had a different status in the disaster-management experience of Turkey. It was the first disaster to hit Turkey after the implementation of a new disaster-management system, which was expected to work flawlessly after the lessons learned from the Marmara Earthquake. This earthquake was also important because it assessed the performance of AFAD, and measured the accuracy of its predictions and preparations for the pre- and post-disaster phases. With regard to the losses, the Van Earthquake resulted in 604 deaths and 4,152 injuries. At least 11,232 buildings sustained damage in the region, 6,017 of which were found to be uninhabitable. In other words, at least around 60,000 people were left homeless (Hacaloglu 2011).

b. Pakistan

Pakistan has also experienced a variety of natural disasters. This vulnerability originates from its geography. It is a country with diverse topography and climatic conditions. The country is situated on the Indo-Australian plate, is continuously moving northward and sub-ducting under the Eurasian plate, thus triggering earthquakes. Fifty-six percent of the Indus basin lies in Pakistan, including five major rivers. This basin and its rivers command approximately 70 percent of the country. The South Asian monsoons regularly cause overflow of the rivers, resulting in floods in large parts of the country. About 60 percent of the total area receives an annual rainfall of less than 200 millimeters, and is classified as arid. Less than average rains in these areas result in drought conditions. Coastal belts of the country are also vulnerable to cyclones and tsunamis. Some of the natural disasters that have struck the country in past are listed in this section (GFDRR 2009).

In 1935, a 7.7 Richter scale earthquake hit the city of Quetta, the capital of the western province of Baluchistan, and virtually leveled the city. Approximately 60,000

people were killed in the disaster. In 1945, another earthquake of a 7.8 Richter scale magnitude hit the coastal region of the same province, causing a 40-foot Tsunami, inflicting 4,000 deaths and a huge loss of property. In 1950, monsoon rains caused severe floods, affecting the provinces of Punjab and Sind, killing 2,900 people, rendering 900,000 homeless, and leveling over 100,000 homes. In November 1970, a high-intensity tropical cyclone hit the eastern part of the country (now Bangladesh); this was one of the worst natural disasters in modern times. Storm surges flooded large parts of the territory, and approximately 500,000 people lost their lives. In 1974, a 6.2 Richter scale earthquake hit Kohistan and adjacent areas in the mountainous northern part of the country. It was reported that 5,300 people were killed, 17,000 injured, and 97,000 were affected. A cyclone in 1999 in the coastal districts of the Sind province wiped out 73 settlements, killed 168 people in Thatta and Badin, and killed 11,000 cattle. Nearly 0.6 million people were affected by the cyclone. In 2000, a nearly yearlong drought in the arid Baluchistan province caused 100 deaths and affected over one million people. In 2005, an earthquake of 7.6 Richter scale magnitude caused devastation in Kashmir and the Khyber Pakhtoon Khawa (KPK) province. At least 73,000 people were killed, and more than 3300,000 were rendered homeless (UNOCHA 2010).

c. The U.S.

The history of the U.S. is also abundant with various types of natural disasters, including tornados, tsunamis, floods, and hurricanes. Since it has a huge surface area, the country is exposed to almost annually occurring natural disaster events that can be classified as major type disasters. In the last decade, the U.S. has experienced 14 catastrophic natural disasters, all of which resulted in human loss and significant property and infrastructure damage. From researching disaster history, it is predicted that these annual disasters will continue to occur in the future. To this point, the measures and projects held by FEMA gain importance in order to decrease vulnerability and increase the efficacy of the reaction period during the event.

Beginning in the twentieth century, the San Francisco Earthquake in 1906 was the worst disaster in terms of human lives lost. In this disaster, about 3,000 people died, and

over 80 percent of San Francisco was destroyed when the earthquake was compounded with the fires generated by the disaster's shock waves (The Virtual Museum of the City of San Francisco, n.d.).

In 1980, a heat wave in the U.S. resulted in at least 1,700 deaths and about \$20 billion of agricultural damage to the affected areas (NOAA, n.d.). Hurricane Andrew in 1992, the Northridge Earthquake in 1994, and the Oklahoma tornado outbreak in 1999, are other destructive events that occurred in the last century.

In the twenty-first century, Hurricane Charley, Hurricane Frances, and Hurricane Ivan all hit in 2004, causing more than 150 deaths and about \$45 billion of damage (Florida Department of Agriculture and Consumer Services, n.d.; NHC, n.d.) The most destructive disaster in this century was Hurricane Katrina in 2005, which resulted in 1,836 deaths and about \$84 billion to the U.S. economy (NOAA 2011a). The Mississippi River floods in 2011, the April 25–28 tornado in 2011, the Joplin tornado in 2011, and finally Hurricane Sandy in 2012 were some other major and large-scale catastrophic events that have occurred in the current century.

4. Effects of Natural Disasters on Turkey and Pakistan

a. Turkey

As stated earlier, Turkey is a country highly vulnerable to natural disasters, especially earthquakes. Many people and assets have been lost in these catastrophic events. The most significant reality about the effects of disasters is that the post-disaster damage is usually higher in underdeveloped or developing countries due to the lack of transportation logistics, infrastructural developments, and organizational strategy and vision. Often the affected country wrestles with the outcome of the disasters as well as the preparations necessary during the pre-disaster phase. To justify this claim with examples, the death toll in the 1999 Marmara Earthquake in Turkey was much higher when it was compared to even higher magnitude earthquakes in Los Angeles in 1994, and Kobe, Japan in 1995. The results in Turkey were worse than the other two because the construction concrete and pre-disaster preparation, in addition to the ineffective

organizational strategy, aggravated the consequences of the disaster (Akturk and Albeni 2002).

Another effect on Turkey was the new stand-by treaty with the International Monetary Fund (IMF) resulting from the unexpected costs of disasters. In other words, the lack of a disaster emergency funding pool compelled Turkey to apply for international aid and funds that affected the regular loan payments to the lenders; especially the World Bank and IMF. The great financial depressions in 2000 and 2001 can be manifested as a corollary of the Marmara Earthquake in 1999 (World Bank 1999).

Finally, these events always cause socio-psychological effects on the society. The imminent loss of lives, accommodations, and sudden disruption of daily life cycle create significant problems and stress for people, which should be handled by specialists and experts in this field. Since Turkey did not have this knowledge and scientific background, past natural disasters affected the people very deeply by disorganizing their dynamics of personal and social identities. In 2011, during the Van Earthquake in Turkey, many researchers reported that those affected in the area showed psycho-social disruptions, in addition to permanent cognitive apprehensions and fears regarding their future expectations from life (Yilmaz and Isitan 2012).

b. Pakistan

Pakistan is a developing country with a population of approximately 190 million. General conditions include a largely poor population dependent upon agriculture and farming. The majority of the population is living in rural areas with poor quality housing, meager allocations for disaster mitigation, and ineffective disaster-management systems. All these factors exacerbate the effects of natural disasters when they strike. During the past, natural disasters have resulted in huge losses in terms of life and economy. Disasters have a huge impact on development in the country in general, and the affected areas, in particular. Each new disaster not only compels a diversion of scarce resources toward relief efforts, but also has a negative effect on progress already made. In the case of some major disasters, decades of achievements were wiped out in moments, with affected areas

and communities being pushed back for decades. Table 1 summarizes the losses inflicted by natural disasters in Pakistan (EM-DAT 2013).

Table 1. Natural Disaster-Related Losses in Pakistan

Category of Disaster	Nature of Disaster	# of Events	Killed	Total Affected	Damage (US\$)
Drought	Drought	1	143	2200000	247000
	Average per event		143	2200000	247000
Earthquake (seismic activity)	Earthquake (ground shaking)	25	143016	6588582	5229755
	Average per event		5720.6	263543.3	209190.2
Flood	Unspecified	24	4372	20671883	1170030
	Average per event		182.2	861328.5	48751.3
	Flash flood	14	3006	22097725	10073118
	Average per event		214.7	1578408.9	719508.4
	General Flood	40	8961	33936619	8125030
	Average per event		224	848415.5	203125.8
Storm	Unspecified	7	184	2988	-
	Average per event		26.3	426.9	-
	Local storm	9	180	1385	-
	Average per event		20	153.9	-
	Tropical cyclone	7	11555	2599940	1715036
	Average per event		1650.7	371420	245005.1

B. EVOLUTION OF DISASTER MANAGEMENT

Disasters have adversely affected mankind since the beginning of human life on Earth. Accordingly, humans are looking for ways and means to protect themselves from the consequences of the disasters. The approach and methods for disaster management in the past depended upon the resources and progress made by a particular society.

1. Historical Perspective

Disasters have been such an important part of history that at times they actually steered and shaped it. Entire civilizations have been wiped out instantaneously. As Coppola states “theorists have even ventured to suggest that many of history’s great civilizations including the Mayans, the Norse, the Minoans, and the Old Egyptian Empire, were ultimately brought to their knees not by their enemies, but from the effect of floods, famines, earthquakes, tsunamis, El Nino events, and other widespread disasters” (Coppola 2006). Past generations were also aware of various hazards. They resorted to actions and measures that helped reduce and/or mitigate the adverse effects of the disasters. Several historical records from different periods indicate an analytical approach and organized measures to deal with the disasters.

Noah’s Ark: The story of Noah’s Ark as mentioned in two religious books (i.e., Old Testament and Quran) provides details of how Noah dealt with the great floods. It includes insight regarding important disaster-management concepts being practiced today, such as warning, preparation, and mitigation. The story begins when Noah receives a warning regarding an upcoming flood of great magnitude. His family and followers set out to prepare a large ark to survive the flood period. They store large quantities of supplies on the ark, and place in the ark a pair of all species of animals on Earth. Finally, the flood comes and submerges the land. Noah and his companions board the ark and remain until the water recedes. Those who did not heed the warning and prepare for the disaster perished.

The Asipu: Asipu was a social group that lived in Iraq around 3200 BC. They performed the tasks of risk management and decision analysis for the community. When faced with a difficult situation, especially danger and risk, the community turned toward

the Asipu for guidance. Using techniques similar to present day hazard risk management, the Asipu would analyze the problem, come up with possible alternatives, and develop a response to each alternative (Vincent and Manpower 1985).

Herculaneum and Pompeii: The towns of Herculaneum and Pompeii faced grave threats when the volcano Vesuvius erupted in 79 AD. The city of Herculaneum was at the base of the volcano and in the path of lava flow and was, therefore, buried under the molten lava when the volcanic eruption took place. The people of Pompeii had some warning before the lava reached their town. City leaders utilized this time to evacuate the city, which resulted in the majority of residents escaping the threat. Some of the people who refused to leave the city were buried under ashes, like the residents of Herculaneum. This incident indicated existence of organized disaster-management response in that era (Coppola 2006).

2. Modern Roots of Disaster Management

Disaster-management approaches that address potential hazards threatening a community or country are a new concept. However, by glancing backward, we can identify disaster-management programs aimed at addressing a particular hazard. There existed highly effective programs, not only in mitigating relevant threat, but also in producing positive effects in the environment. Following are some of the examples.

Flood Fighting: Human settlements have always thrived along the rivers and waterways. However, when these water courses swelled, they also posed great dangers to those living close by. Early civilizations were aware of the problem and attempted to address the issue. One of the renowned examples is of ancient Egypt under Amenembhet III (1817–1722 BC). Using a system consisting large water wheels numbering over 200, Amenembhet III developed a river control project. This system diverted the Nile floodwater to Lake Moeris, not only mitigating the threat of flood, but also helping to reclaim 153,000 acres of fertile land (ESIS, n.d.).

Firefighting: The history of organized firefighting dates back 2000 years, when the city of Rome was nearly destroyed by a fire. After this great fire, Emperor Augustus assigned the task of firefighting to a unit of the Roman Army. New systems ensured an

organized and effective mechanism of firefighting, a task previously performed by slaves that lacked training, equipment, and motivation. With a new organization, firefighting became a respectable job. The organizational structure was followed by the Roman Empire for 500 years, and some of the structures of those firefighting units are still being used in many firefighting departments today (Coppola 2006).

Food Shortages: Famine and starvation were regular features in British India during the nineteenth century. The problem was so severe that there were up to 1 million starvation-related deaths each year. A governmental study revealed that sufficient food existed throughout the subcontinent to feed its entire population. The root cause of the problem was poor distribution systems that hindered the availability of sufficient stocks at required places. To overcome the problem, the government introduced a mechanism that revolved around identification of indicators for emerging needs, monitoring of public health, and an extensive railway system across the breadth and length of the country to enable quick transportation of grain. This system proved very effective, and is still being followed in certain ways (Coppola 2006).

3. Birth of Contemporary Emergency Management

Contemporary emergency management systems have their roots in the “Civil Defense Era.” In the middle of the twentieth century, realizing the threats of air raids and potential nuclear strikes, industrialized nations embarked upon an elaborate civil defense system. The system included an early warning mechanism, protective housing, and search and rescue organizations to handle post-strike situations. Individual countries introduced proper legislation to guide the organization and functioning, as well as regular funding of respective civil defense organizations. These legislative works formed the basis of the modern emergency-management organization in most of the countries. For example, the Federal Civil Defense Act of 1950 is the foundational document for the United States Federal Emergency Management Agency. In some of the developing countries, disaster-management systems were drastically restructured as a consequence of the apparent inability to handle a major disaster in the country, as was the case of the National

Disaster Management Agency in Pakistan that was developed after the devastating earthquake of 2005.

a. Disaster Management Cycle

Disaster-management cycle is comprised of several phases that can be related to a disaster and mitigation effort. Descriptions of these phases can be traced back as far as 1930 (Neal 1997); however, these were more focused on understanding the disaster, as well as relief-focused response. This approach started to change in the 1970s, with the realization that relief-oriented disaster management may not be the most judicious method of mitigating the disaster. To accommodate the shift in traditional thinking within the field of disaster management, ‘new mechanisms’ were needed to drive the management of disaster situations. One of these was the disaster-management cycle that was designed to illustrate the ongoing process by which governments, businesses, and civil society planned for, and reduced, the impact of disasters, planned response during and immediately following a disaster, and took steps to recover after a disaster had occurred (Coetzee and Niekerk 2010). A disaster-management cycle proposed in 1975 comprised six different phases, including: reconstruction; mitigation and prediction; preparedness for relief; and warning, relief; and rehabilitation (Baird et al. 1975). Thereafter, many variations and deviations have been made in the structure of the disaster-management cycle and its application. Disaster-management cycles proposed by the United Nations Development Program (UNDP) in 1992 were comprised of five phases (UNDRO 1991). In 2002, disaster-management scholar and author David Alexander proposed another cycle comprised of four distinct phases including: mitigation; preparation; response; and recovery as shown in Figure 2 (Alexander 2002). This model is being widely used by various organizations; however, there have been several other models that organize the cycle into overarching phases relative to the disaster (i.e., pre-disaster and post-disaster) (Holloway 2012; Khan and Khan 2008).

There are four main axes in the disaster-management cycle:

1. **Mitigation:** This phase consists of activities that encompass the risk estimations and evaluations that will reduce and eliminate the loss of life and property.
2. **Preparedness:** This phase deals with the preparation and training for disaster management operations. Moreover, this phase maintains the required coordination with the people and institutions for a better preparation.
3. **Response:** This phase demonstrates accuracy of all the preparations and plans that are done in the prior phases.
4. **Recovery:** This phase has the activities that deal with the healing and normalizing of life systems in the disaster-affected areas.

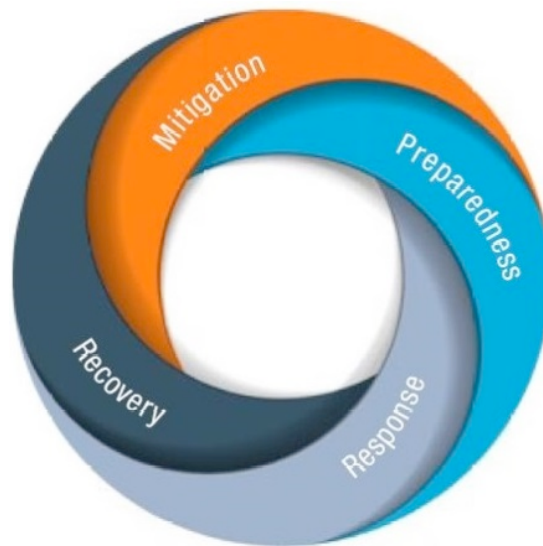


Figure 2. The Disaster Management Cycle (from Alexander 2002)

b. Disaster Management – Organizational Structures

Comprehensive emergency management, as well as the organizational structures linked to it, is a relatively new concept. Originally, the job of dealing with the emergencies was left to the local governments and the communities. In most cases, due to a shortage of resources and capacity, the local response was mostly directed at providing post-disaster rescue and relief. Preparation efforts in this regard would be restricted to capacity building, including purchasing equipment and training as previously deemed necessary for handling disasters faced by the community. Similarly, at the higher levels

of government, disaster-management efforts were mostly directed toward extending financial, material, and manpower support to the affected communities on a required basis. The most noticeable effect of this practice was that local communities were never adequately prepared to deal with a major disaster when it struck.

A change in said framework occurred in the post-World War II era, but it was not directly related to natural disaster management. Realizing the catastrophic results of a possible nuclear strike from an adversary, several countries, such as the U.S., the UK, and other developed countries in that era, established national civil protection agencies to help the local communities prepare for such contingencies. These agencies guided the local and regional governments in building community shelters, enhancing public awareness, and preparing medical and other response teams. These national civil protection agencies are seen as the root of many of the present day emergency-management organizations. Transformation of the civil protection agencies towards the emergency management role is linked with the decline in threat of nuclear strikes as well as realization regarding increased human and financial costs of natural disasters. Recognizing the need, many nations, including those mentioned earlier, began legislation to expand the role of national civil protection agencies in dealing with all hazards (Coppola 2006).

Situations in developing countries did not improve, either due to a lack of resources or other limitations, and emergency management remained restricted to localized and post-disaster efforts. During the 1994 World Conference on Natural Disaster Reduction, developing countries that lacked an organized disaster management capacity, committed to develop required structures. In pursuance of the Yokohama Strategy and a Plan for Action for a Safer World, most nations took steps to establish a dedicated national agency to deal with natural hazards (Coppola 2006).

When looking at the contours of organizational structures of disaster-management systems, they are mostly linked to the system of government being followed in a particular country. However, an ideal system seeks an elementary disaster-response mechanism at a local level, which is supplemented by a national agency to make it more comprehensive and potent. With the passage of time, the expertise and skills are built at a

national level, and are transferred to local levels depending upon availability of resources. Various frameworks that are being used to support emergency management in today's world are:

1. **Locally Based Structures:** Locally based emergency-management structures include the fire department, police department, emergency management service, and office of emergency management. Their effectiveness is linked to the fact that community members know the needs of the community, and are the ones with a maximum stake in effective emergency management. They can be most effective in mitigation and preparedness which greatly depend upon local knowledge, local input and buy in, and dedication for effective implementation. When the magnitude of disaster grows beyond the capacity of local response agencies, regional and/or national agencies are also brought into action with necessary manpower, technical and financial resources to assist. However, even in such situations disaster management is best executed when done under the leadership of the local executive. Countries with well-developed local emergency management systems (regardless of the existence of a regional or national disaster management system) include the U.S., the UK, Brazil, and New Zealand (Coppola 2006).
2. **Regionally Based Structures:** While local governments govern smaller geographical areas, there could be regional governments present in a country having command over larger areas comprising a number of localities. In the case of a federal system of government, regional or state governments have broad powers to make laws, generate and spend resources, as well as guide the functioning of local governments. In such systems, regional government retains the authoritative base of emergency management. In many countries, first response agencies including police and fire departments are funded and dispatched from the regional level with local officials having very little control over the actions of emergency management agencies. On the other hand, in many countries, even those with a locally controlled emergency management base, regional emergency management agencies exist. They focus on policy setting, direction and governance, funding and capacity building for local agencies. When both local and regional agencies exist together, the latter may be called upon when the former is overwhelmed by the magnitude of disaster and may either assist or take on coordination responsibility to manage resources coming from outside the concerned jurisdiction (Coppola 2006).
3. **Nationally Based Structures:** Almost all countries have established a national disaster-management agency, partly due to UN recommendations. The scope and effectiveness of these agencies vary according to their position within national government, size, funding, and training. National emergency-management agencies are most suited in supporting roles,

leaving actual decision making to regional and local emergency management agencies. Lack of sufficient resources to meet the specific needs of all communities as well as distance from actual stakeholders undermine their effectiveness in different phases of disaster management including preparation, mitigation, and response. Nevertheless, national agencies have important functions including (Coppola 2006):

- Formulate national emergency-management policies and plans
- Organize training for regional and local emergency managers and workers
- Provide funding for regional and local agencies
- Provide technical assistance and specialized resources
- Coordination and facilitation of foreign assistance

C. DEVELOPMENT OF DISASTER MANAGEMENT ORGANIZATIONS IN THE U.S., TURKEY, AND PAKISTAN

As discussed earlier, current hazard- and disaster-management organizations have evolved from similar origins, but in different circumstances and timeframes. Civil defense systems can be identified as the basic structure as the predecessor of the incumbent national disaster management organizations being considered here.

1. U.S.

The federal government's involvement in natural disaster dates back to 1803, when a congressional act was passed to provide financial assistance to a fire devastated town in New Hampshire (Elsevier, n.d.). Similarly, fire disasters, a significant hazard for cities in the nineteenth century, often lead to more ad-hoc legislation by Congress, aimed at reducing financial hardship of affected communities (FEMA 2010). Authorizing the Reconstruction Finance Corporation and Bureau of Public Roads to make disaster loans available for reconstruction of public facilities destroyed by disasters, the Tennessee Valley Authority and Flood Control Act of 1934 assigned greater flood control responsibilities to the Army Corps of Engineers. Consequently, major steps were taken in the first half of twentieth century in the context of disaster management. The 1950s marked creation of the Federal Civil Defense Administration focused on protection against nuclear attacks, and the Office of Defense Mobilization, with "emergency

preparedness” as one of its functions. The two were merged into the Office of Civil and Defense Mobilization under the Department of Defense. It pointed towards changes in the federal government’s financial assistance based disaster assistance approach (Elsevier, n.d.). In the next decade, several significant disasters struck, and in response, fresh legislations were designed and new setups created to assist those affected. This included the National Flood Insurance Act, offering federally guaranteed flood insurance to homeowners, and creation of the Federal Disaster Assistance Administration under the Department of Housing and Urban Development to extend housing and other forms of aid to survivors. The federal government’s disaster relief role was significantly extended with the Disaster Relief Act of 1970 to include federal loans and tax assistance, federal funding for repair and replacement of public facilities, and authorization of funds for mitigation of potential impacts of disaster threats. It also engaged a partnership between federal, state, and local governments in disaster response (FEMA 2010).

These steps enhanced the federal government’s role in emergency management; however, the path through which these steps were taken resulted in a large number of federal departments responsible for their specific task. The absence of a single central authority resulted in coordination problems. Working with more than 100 federal departments and agencies, and a corresponding number of state and local governments, complicated the preparedness and disaster response that led the National Governors Association in 1979 to urge national leadership to centralize the federal emergency management function. As a result, the federal Emergency Management Agency (FEMA) was created through a presidential executive order during that same year, consolidating many separate disaster-related functions, and bringing responsible agencies at the federal level under its umbrella (FEMA 2010).

During coming years much energy went into realigning and consolidating of diverse policies, programs, and objectives that came along with FEMA’s component agencies. It was with this effort that the Agency developed an Integrated Emergency Management System, adopted an All Hazards Approach, and developed a positive relationship with state and local governments and the communities. The last major

organizational change in the disaster-management structure was affected when in the post-9/11 era FEMA was switched from the purview of the White House to the newly created Department of Homeland Security (Elsevier, n.d.).

2. Turkey

Before the Turkish Republic era, examples of the first regulations in natural disaster management go back to a royal decree by the Ottoman Sultan Beyazıt II following the Istanbul Earthquake of September 14, 1509. This earthquake resulted in over 13,000 deaths and destruction of 109 mosques and 1,047 buildings. In addition, another important document was introduced that corresponded to the Regulation of Building (by the Ebniye Nizamnamesi) issued in 1848, as a result of the need to introduce rules for urbanization and housing.

During the Turkish Republic period, the natural disaster system was exposed to some important changes and adaptations, as a result of the Erzincan Earthquake in 1939, and the Marmara Earthquake in 1999. The most significant modification in the natural disasters-management system was put into effect in 2009, when the system structure and organizational networking were redesigned and adapted to the modern world's requirements. Due to this, it would be more accurate to classify the development phase as the pre- and post-2009 periods.

a. Legislative Development

Legislation is a government's response to the changing conditions in processes and policies affecting the daily life and necessities of the people. The most formal and official ways to modernize the disaster-management systems are governmental legislation. Policy development is critical to Turkey due to its various natural disasters. As mentioned in an earlier section, Turkey is geographically vulnerable to earthquakes, so the disaster or crisis management terms are generally used for the response to tectonic events. However, due to the changing atmospheric conditions and some other human-made factors, Turkey has started to experience other kinds of natural disasters, such as floods and landslides. Thus, the legislation history of Turkey shows the variation and adaptation due to the recently emerging events and necessities (Ganapati 2008).

Pre-1944 Period: This era was actually the nascent stage of the disaster-management system formulation, so due to the lack of expertise and technology, this era only became actively effective after disaster occurred. This period is generally referred to as the post-event response period by researchers. Since this period was devoid of effective and systematic crisis management policies and activities, the response phase of disaster-management cycle was comprised of only two axes out of four. These response and recovery phases were in contrast to the preparedness and mitigation phases (Ganapati 2008). Due to the necessity for lessening the effects of disasters, the government enacted a Mitigation Law (No. 4373) in early 1943 (Corbacioglu and Kapcu 2005).

The 1944–1955 Period: Because of the devastating earthquakes in this period, the government felt the need to consider the disaster-management issue more seriously. Since this period was abundant with much entrenched legislation, it can be called the ‘feeble countermeasures’ period. In this period, the hardest task for the government was to sustain a resilient mitigation and preparedness plan for disaster response. As a result, the government started to enact a cascade of proactive laws.

The 1955–1998 Period: This period is the first step in transition to a more complex and comprehensive structure in disaster management. For that reason, this period is called the ‘ministry response for disaster and construction’ period. This period is also important because the first means of other types of disasters were considered as risk factors for Turkey; however, many legislative laws were enacted to increase the efficacy of response to other types of disasters, including earthquakes.

The 1999–2009 Period: The opening event of this period was the devastating earthquake of Marmara in 1999, which was one of the most destructive natural disasters in Turkish history. Since this earthquake caused Turkey to review its natural disaster-management system, the innovations and modifications done in this period have named this era the awakening period.

b. Administrative Development

As discussed previously, the milestones in the disaster-management system of Turkey include the Marmara Earthquake in 1999 and the foundation of AFAD in 2009. Even though the crisis-management system was highly centralized and strictly hierarchical before 1999; however, the adaptations and improvements made after 1999 did not respond to the actual needs of a successful management strategy and effective organizational structure.

During the pre-1999 era, the state was in the center of the process in assuming the dominant role in the disaster-management cycle. In other words, the crisis-management structure was “paternalistic, wherein the state was responsible for most phases of disasters” (Ganapati 2008).

To continue with post-1999 period, the first benchmark in the disaster management history of Turkey was the Marmara Earthquake in 1999, for it manifested the weaknesses and inefficiencies of the previous disaster policies. The first reaction to the problematic structure was the foundation of the Turkish Emergency Management General Directorate (TEMGD) for the coordination of public organizations in emergencies. Another reaction was to increase the quality and the quantity of the manpower serving in the General Directorate of Civil Defense (GDCD).

From a military perspective, the Turkish Armed Forces transformed one of its battalions to a search and rescue battalion to strengthen its effectiveness in disasters, and founded the Natural Disasters Search and Rescue Troop (Turkish Armed Forces, n.d.b.).

During the pre-2009 period, the main government organizations responsible for disaster management were the Turkish Emergency Management Directorate (TEMGD) of the Prime Ministry, the General Directorate of Disaster Affairs (GDDA) of the Ministry of Public Works and Settlement, the General Directorates of Civil Defense (GDCD) of the Ministry of the Interior, and the General Directorate State Hydraulic Works (SHW) under Energy Ministry (Unlu, Kapucu and Sahin 2010).

c. *Disaster Management System of Turkey After 2009*

In the light of devastating historical disasters, and after the tough lessons learned from the Marmara earthquake in 1999, Turkish congress determined to form a more comprehensive and effective structure that would meet the all the needs of a successful management program to sustain the efficacy and maximum utilization of resources in the response of disaster management operations. As a result of these legislative and executive processes, a new law, no. 5902, was enacted and promulgated in the governmental newspaper on June 17, 2009. According to this law, the Department of Civil Defense, Department of Emergency Management of Turkey, and Department of Disasters were shut down, and the Disaster and Emergency Management Presidency (AFAD) was founded.

This new legislation aimed to increase measures that should be taken nationwide, improve the virtuous cycle of response after disaster; enhance the coordination and communication among the departments responsible for disaster management (Republic of Turkey Prime Ministry Disaster & Emergency Management Presidency, n.d.). Some major changes with this legislation were the creation of the following:

- Disaster and Emergency Supreme Board
- Disaster and Emergency Coordination Board
- Earthquake Advisory Board

d. *Non-Profit Organizations and Civil Society in Crisis Management (1999–2014)*

The Turkish Red Crescent Society (TRCS), established in 1868, is one of the main NGOs within the disaster-management structures in Turkey. It has national, provincial, and district-level committees, and it actively operates in disaster areas (Turkish Red Crescent, n.d.). A well-equipped Disaster Operation Centre (AFOM) has also been established in Ankara (Turkish Red Crescent 2010).

The development of NGOs in disaster management was another turning point for Turkey, which was achieved when the government gave up its “paternalistic” approach

and shared the responsibilities with non-profit organizations that had been underestimated until 1999 (Ganapati 2008).

Another significant action taken after the 1999 earthquake was the establishment of an independent organization called the National Earthquake Council, which consists of scientists from different fields such as earth scientists, structural and earthquake engineers, environmental engineers, architects, urban planners, and psychologists. The goal of the council is to identify priority research areas for disaster mitigation in the country (Unlu, Kapucu and Sahin 2010).

Some other important NGOs in disaster management include the Turkish Radio Amateur Club, which was founded in 1962 to provide post-disaster communication services (Turkiye Radyo Amatorleri Cemiyeti, n.d.), and Arama Kutarma Dernegi (AKUT), which is the leading model for many volunteer search and rescue organizations (Arama Kurtarma Dernegi, n.d.).

3. Pakistan

Since its creation in 1947, emergency response has remained a predominant approach in Pakistan to deal with disasters, mainly focusing on rescue and post-disaster assistance. Several organizations and departments were established or mandated with disaster response. The Civil Defense Department was the first such structure established in 1951. It was primarily mandated to take protective measures against hostile actions by a foreign power, but it was also assigned additional tasks of taking remedial measures against natural or man-made disasters (WCDR 2005). The Calamity Act of 1958 remained as basic legislation for conduct and disaster management until 2006. Under this act, a system of relief was commissioned at a provincial level for disaster response management. It also provided for an Emergency Relief Cell in the cabinet secretariat to coordinate disaster response by the federal government (NDMA 2007a).

Until 1970, the Pakistan Civil Defense was the focal agency for responding to disasters. In the aftermath of the 1970 cyclone in East Pakistan (now Bangladesh), the Emergency Relief Cell (ERC) was established, which became the government's focal

point for emergency relief in disaster-hit areas (WCDR 2005). Severe floods of 1976 compelled the government to take serious steps. As a result, it created the Federal Flood Commission (FFC) with responsibility for implementing flood prevention and mitigation measures, and organizing an early flood warning system. The FFC issued its first flood protection plan in 1978, with emphasis on structural works. The FFC also launched a comprehensive flood forecasting system in 1992, in response to disastrous floods that struck in same year (NDMA 2008). In 2003 a Task Force under the Ministry of Interior was set up for reorganizing emergency services with the objective of responding to disasters in a comprehensive manner. Based upon its recommendations, a dedicated Emergency Rescue Service could only be established in the province of Punjab (NDMA 2011a). Other national agencies and departments contributing to emergency disaster relief also included the Crisis Management Cell (Ministry of Interior), local fire departments, police, and other ministries/departments (with a preview of their conventional charter of duties). Throughout this period, the Armed Forces of Pakistan played a key role in each significant disaster that occurred in the country.

A disastrous earthquake that hit the country in 2005 is an important point in the disaster management history of Pakistan. The reactive crisis response approach was overwhelmed by the magnitude of the calamity. It forced officials to realize the inadequacies of existing disaster management approaches, and to adopt a comprehensive disaster-management approach and institutional arrangement to deal with future disasters. The change in thinking led to the National Disaster Management Ordinance in 2006, which promoted the current disaster-management system. The National Disaster Management Commission (NDMC) and National Disaster Management Authority (NDMA) were established at the national level. Subsequently, the Provincial Disaster Management Commissions (PDMCs) and Provincial Disaster Management Authorities (PDMAs) were established in all provinces. At the local level, District Disaster Management Authorities (DDMAs) were established at the district level. This new system envisaged a comprehensive all-hazard approach toward disaster management to reduce the risk through prevention, mitigation, and preparedness (NDMA 2011).

III. DISASTER-MANAGEMENT PROCESSES AND THEIR FUNCTIONING DURING SPECIFIC CASES

Several disaster management models offer varying organizational structures and entire disaster-management processes. The underlying reasons for adoption of a particular system by a country may vary from the nature of government, existing disaster-management infrastructure, resource availability, the process through which a particular model has been evolved or adopted, and the societal approach to disaster management as a whole. Despite similar mission and objectives, differences in organizational structures and processes affect the performance of disaster-management organizations. In this chapter, we will look into current disaster-management systems, including the organizational structures and the processes being followed in Pakistan, Turkey, and the U.S. In addition, we will review the performance of respective national disaster-management structures during specific natural disasters.

A. PAKISTAN

The National Disaster Management Ordinance in 2006² was re-enacted as an Act of Parliament,³ and became the legislation that provided for the establishment of the current National Disaster Management System of Pakistan. These documents provided significant guidance regarding new structures created as part of the National Disaster Management System, as well as their powers and functions.

1. Organization of Disaster Management System

Pakistan's disaster management system is based upon separate policy-making commissions and executing agencies at various levels of the government.

2 National Disaster Management Ordinance 2006, Public Law No. 2(1) / 2006 – Pub.(B). <http://saarc-sdmc.nic.in/pdf/pakistan/file1.pdf>

3 National Disaster Management Act 2010, Public Law No. F.9 (28) /2010 – Legis. http://www.na.gov.pk/uploads/documents/1302135719_202.pdf

a. Organizational Structure

Figure 3 shows the organization structure for Pakistan’s Disaster Management System.

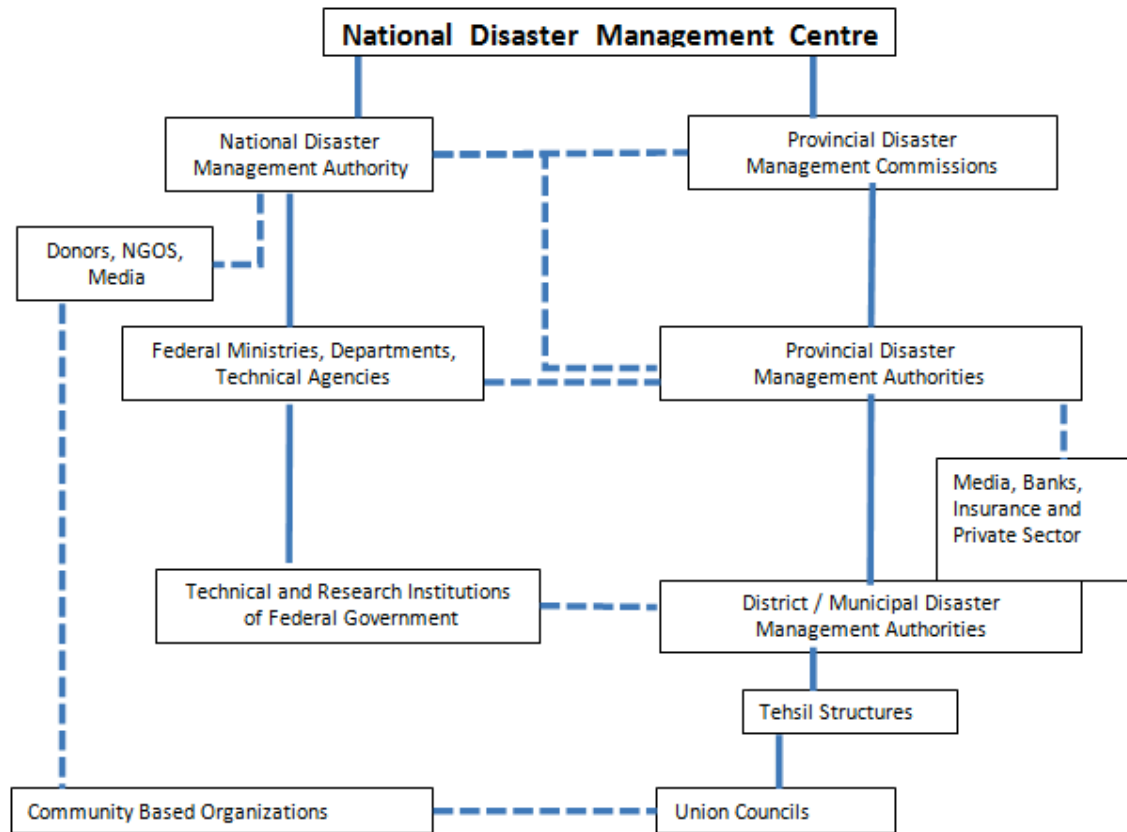


Figure 3. Organizational Structure of Disaster Management System (from GOP 2007)

b. Organizations and Their Functions

Disaster management commissions are policy-making bodies responsible for setting parameters of disaster management operations for disaster management agencies at their respective levels.

National Disaster Management Commission (NDMC): It is the apex policy and the decision-making body on disaster management at a national level. It is headed by the prime minister, and includes other important functionaries, including the leader of political opposition, provincial chief ministers, heads of key federal ministries, and chairman of the NDMA. Some of the important functions of NDMC include:

- Laying down policies on disaster management
- Approving national disaster management plans
- Establishing guidance to be followed by federal ministries and the provinces
- Ensuring availability of necessary resources for capacity building as well as disaster management⁴

Provincial Disaster Management Commission (PDMC): PDMC is the replica of NDMC at a provincial level. It is organized along similar lines and is responsible for policy and control functions in the respective provinces within the overall framework as approved by NDMC.⁵

National Disaster Management Authority (NDMA): NDMA is the lead agency at the federal level to deal with a whole spectrum of disaster management activities. It is the executive arm of NDMC. In the event of a disaster, all stakeholders, including government ministries, departments, organizations, Armed Forces, INGOs, NGOs, and UN Agencies comprise part of the NDMA to conduct a one-window operation. NDMA focuses on developing a sustainable operational capacity and professional competence to undertake the following tasks (NDMA, n.d.a).

- Coordinating complete spectrum of disaster risk management at a national level
- Developing guidelines and standards for national and provincial stakeholders regarding their role in disaster risk management

4 National Disaster Management Act 2010, Public Law No. F.9 (28) /2010 – Legis
http://www.na.gov.pk/uploads/documents/1302135719_202.pdf

5 Ibid.

- Providing technical assistance to federal ministries, departments, and provincial disaster management authorities for disaster risk-management initiatives
- Holding training and awareness raising activities for capacity development of stakeholders, particularly in hazard-prone areas
- Serving as lead agency for international cooperation in disaster risk management
- Coordinating the emergency response of the federal government in the event of a national level disaster through the National Emergency Operations Centre (NEOC)
- Preparing disaster risk management plans and implementation reviews
- Overseeing the provision of funds for risk reduction and preparedness measures (NDMA 2007b).

NDMA is organized into three wings, including disaster risk management (DRM), operations (Ops), and support and services (S&S). All operations are performed from its location in the national capital of Islamabad, with no permanent tentacles on the ground. Figure 4 shows an organizational structure of NDMA. When NDMA had to deal with the Flood of 2010, it had only Pakistani Rupee 65 million (approximately USD \$74 million) as its annual budgetary allocation, with 21 officers to manage disasters at a national level (NDMA 2011b).

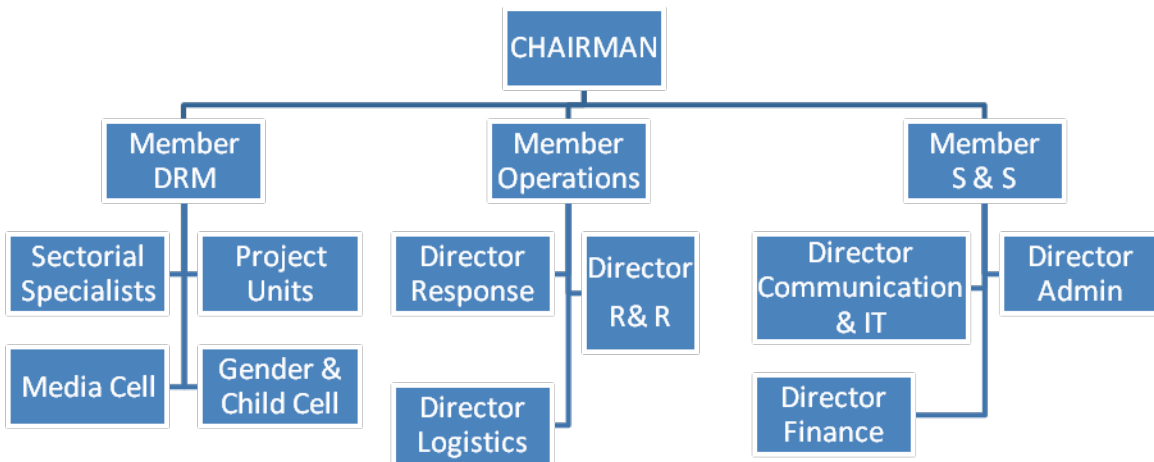


Figure 4. NDMA Organization (from NDMA 2011c)

Provincial Disaster Management Authority (PDMA): PDMA is an executive arm of PDMC. Its mandate includes development and implementation of provincial disaster-management plans in accordance with guidelines provided by NDMA, and subsequently monitoring of operations within an area of jurisdiction. Salient functions of PDMA include:

- Formulating provincial disaster management policy with the approval of PDMC
- Coordinating and monitoring national policy, national plans, and provincial disaster management plans
- Directing provincial departments /agencies regarding actions in response to any disaster
- Coordinating the response of District Disaster Management Agencies during disasters and providing technical assistance when required
- Promoting disaster awareness and education and community training.⁶

District Disaster Management Authority (DDMA): DDMA is the body responsible for looking after disaster-management affairs at a district level. It is headed by the head of district government, and includes top government officials and heads of departments at a district level. Important tasks include:

- Preparing district disaster management and response plans within the confines of provincial planes and policies
- Coordinating and monitoring implementation of national, provincial, and district disaster-management policies and plans.
- Incorporating disaster risk/mitigation factors into the development plans and projects
- Controlling and coordinating disaster response efforts of all departments and agencies
- Establishing stockpiles of rescue and relief goods and ordering release when required.⁷

⁶ National Disaster Management Act 2010, Public Law No. F.9 (28) /2010 – Legis.
http://www.na.gov.pk/uploads/documents/1302135719_202.pdf

⁷ Ibid.

c. National Disaster Response Force

The Disaster Management Act envisages the rise of a dedicated force for the purpose of specialist response to a threatening disaster situation. Four U.S.A.R teams have been created in Karachi, Islamabad, Mardan, and one with Army (NDMA 2013).

d. Other Stakeholders

The following organizations or departments have a role in the disaster-management system (see Figure 5). Their roles vary from funding, assisting in capacity building, and acting as executive agencies (Abro 2012).

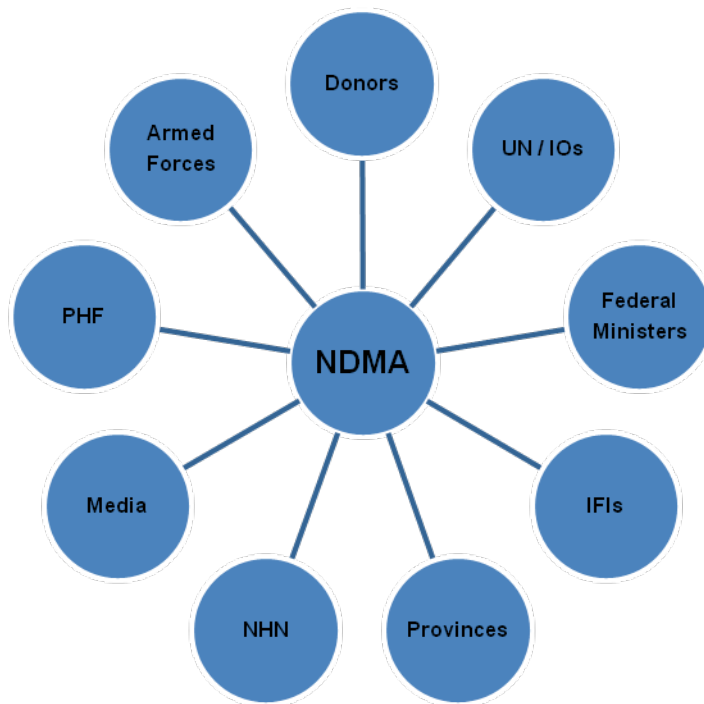


Figure 5. Other Stakeholders

2. National Disaster Management Strategy

Failure of existing disaster management institutions to cope with the devastating earthquake of 2005 in Pakistan compelled the country to rethink its approach toward disaster management. Subsequent to its establishment, the NDMA came up with a National Disaster Risk Management Framework as a policy document to guide the work

of the entire disaster management system. The NDMA identified the following eight priority areas within this framework to establish and strengthen policies, institutions, and capacities over the next five years:

- Institutional and legal arrangements for DRM
- Hazard and vulnerability assessment
- Training, education, and awareness
- Disaster risk-management planning
- Community and local level programming
- Multi-hazard warning system
- Mainstreaming disaster risk reduction into development
- Emergency response system and capacity development for post-disaster recovery (NDMA, n.d.b).

3. National Disaster Management Plans

Pakistan's NDMA designed their National Disaster Response Plan (NDRP) in March 2010. This document covered subjects ranging from disaster risks being faced by the country, as well as the roles and functions of various response agencies, procedures pertaining to emergency declaration, and detailed guidelines regarding desired standards/best practices, and the standing operating procedures for different organizations (NDMA 2010). Despite being very detailed and informative, the NDRP of 2010 fell short of addressing resource allocation, risk mitigation, and capacity building.

4. Floods 2010 and Response

There are five main river systems flowing across the length of Pakistan, with the Indus River as the largest. There are several smaller tributaries that join the Indus River, further augmenting its tributary. For their water source, these rivers either depend upon the snow melting in the northern mountain ranges or seasonal monsoon rains, which usually occur between June and September each year.

The flood in 2010 also had its origin in the monsoon. It started with an easterly monsoon system, and collided with the developing western system over the northwestern province of Khyber Pakhtunkhwa during the last week of July. What followed was heavy

rain that resulted in unprecedented floods in the Sawat and Kabul rivers. Flooding in these rivers was so severe that it seriously damaged Amandara Headworks on the Sawat River, and completely washed away Munda Headworks located further downstream on the Kabul River. The Federal Flood Commission reported a combined flow in the two rivers in excess of 400,000 cusecs, against the previous all-time high of 250,000 cusecs recorded in 1929 (FFC 2011). However, to further complicate the issue, it coincided with extensive rains in the catchment areas of the River Indus upstream of Nowshera (a junction point of the Kabul and the Indus Rivers) and River Jhelum. When floodwater travelled downstream, extreme floods were recorded in the Chashma and Taunsa barrages in Punjab and Sakur, and the Kotri Barrages in the Sind province, before ultimately falling into the Arabian Sea. Some important facts and figures to highlight the losses and damage caused by the floods include:

- Population affected: 20,184,550 (approximately)
- Deaths: 1,985
- Injured: 2,946
- Households Damage: 1,744,471
- Area Impacted: 150,000 sq. km.
- 78 of the country's 141 districts were affected. Figure 6 shows affected flood areas
- 3.4 million children under five years of age were among the affected
- 600,000 expectant or lactating mothers were affected
- 6.2 million consultations by September 20, 2010 for skin diseases, acute respiratory infections, acute diarrhea, suspected malaria, and bloody diarrhea
- 12,516 school facilities either partially or fully damaged
- Out of 2,957,500 health facilities, 500 were damaged or destroyed
- 1.66 million homes were damaged or destroyed
- 17 million acres (out of a total of 43 million acres) of farmland were affected
- 9 million acres of standing crops lost
- 1 million tons of stored grain lost

- Planting of winter crops became difficult in affected areas because of water logged soil, lack of seeds and fertilizer
- More than 1.2 million large and small animals killed and 6 million poultry lost
- More than 5,000 miles of roads and railways were washed away (Niazi 2011)

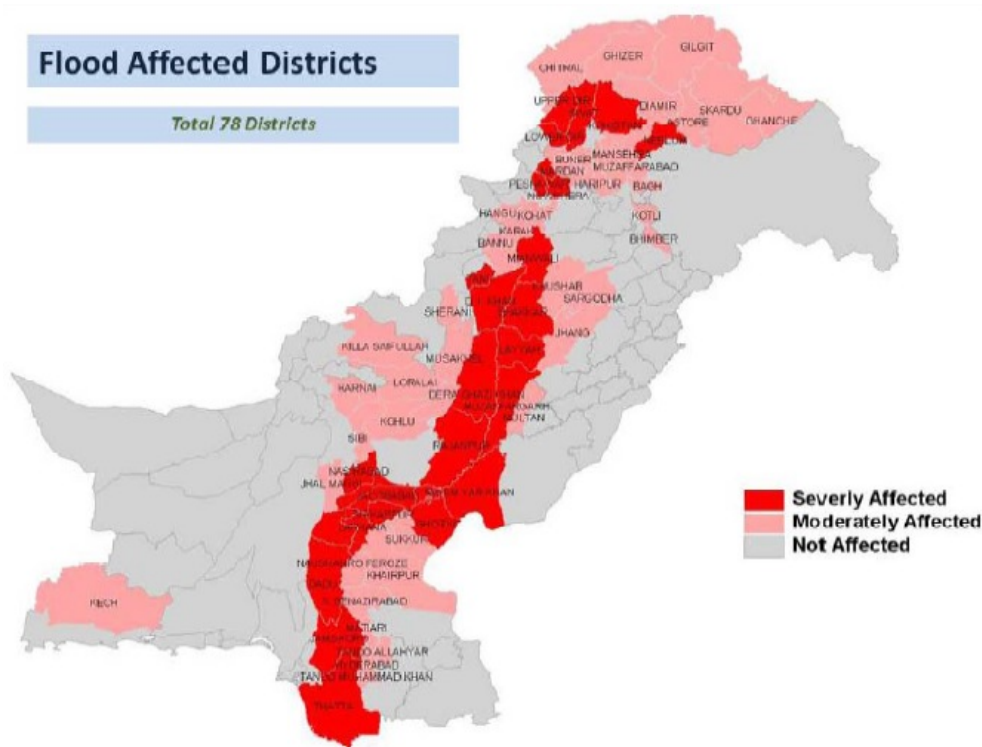


Figure 6. Flood-affected Areas (from DARA 2011)

The NDMA led the response to the floods in 2010, being the Government of Pakistan’s agency responsible for disaster management. Its efforts to organize and coordinate the entire effort, however, promoted issues concerning its role versus other governmental institutions, such as the Economic Affairs Division, key line departments, and the PDMAs. The capacity of the PDMAs differed from province-to-province, with one in KPK performing much better due to its engagement in the handling of large-scale internally displaced persons in the province. The disaster-management system is still in the development stage and continues to link unresolved issues pertaining to the division of responsibilities and institutional capacity, which are sometimes delayed due to poor

cooperation with outside players (DARA 2011). In the field, the Army remains the first and the leading responder, as has been the case in previous disasters (CSIS 2011). However, in 2010, it was working in coordination with the NDMA and PDMA at the national and provincial levels. With 60,000 troops employed during rescue and relief work, the Army rescued over 800,000 individuals, distributed 68,000 tons of rations, and established over 100 relief camps across the country (ISS 2010). One important link that seemed to be ineffective was the DDMA. These agencies were supposed to be the main disaster managers in the field, but remained ineffective due to multiple factors that included absence of elected local government bodies (whose head is also supposed to chair DDMA), lack of institutional capacity similar to the NDMA and PDMA, and the scarcity of dedicated disaster-management resources (CSIS 2011).

Following are some of the issues identified by NDMA that were faced during disaster management:

- Lack of disaster management capacity and paucity of resources
- Lack of legislated authority to control activities of PDMA and/or DDMA, etc.
- Lean pre-disaster organizational structure and meager budgetary allotments (\$74 million)
- Presence of parallel decision-making bodies having overlapping mandates pertaining to disaster management. With the passage of the eighteenth constitutional amendment Council of Common Interest and National Oversight Disaster Management Committee have added another layer in National Disaster Management System (NDMA 2011d)

B. TURKEY

In following sections, a general overview of the disaster-management systems at the national and local levels is provided. The national disaster-management system, as previously discussed, was founded recently. This program provides centralized disaster management through a horizontal rather than a hierarchical structure. For a better understanding of these programs and their structure, see Figure 7 and Figure 8.

1. Organization of Disaster Management System

After the foundation of the AFAD (Prime Ministry Disaster and Emergency Management Presidency) in 2009, the complicated and problematic disaster management system of Turkey was reshaped. The new structure has provided Turkey with a more centralized national disaster-management organization. However, the uncertain responsibilities, ambiguous task allocation, and ineffective planning/programming, budgeting, and execution have remained true at the local level disaster-management organizations.

a. National Level

The AFAD is the national disaster-management organization of Turkey, which operates under the control of the presidency. Despite its central management structure, the AFAD does not have any hierarchical structure with under departments. The AFAD can outsource personnel depending upon the needs of the event or daily operations. Additionally, the AFAD can form and operate working groups by building coordination and cooperation with universities, public organizations, private sector, and NGOs. It accomplishes all these tasks thanks to its administratively horizontal and flexible structure with a results-oriented duty concept. “Based on the fact that disaster management is a subject that concerns all segments of the society, Law No. 5902 established the Disaster and Emergency Supreme Board with participation of ministers for the purpose of making macro-level policies. The Disaster and Emergency Coordination Board, composed of top executives for ensuring coordination in matters related to disasters and the Earthquake Advisory Board, was established to ensure coordination in matters related to reducing earthquake risks and carrying out preparedness activities” (AFAD 2013a).

Regarding the disaster-management and planning concept, Turkey has three governmental boards that determine the scope of the activities that AFAD carries out. These boards include the Disaster and Emergency Supreme Board, the Disaster and Emergency Coordination Board, and the Earthquake Advisory Board. AFAD chairs the

Earthquake Advisory Board; while its role is to execute the secretarial duties of the Supreme Board and the Coordination Board.

Disaster and Emergency Supreme Board: The board is composed of appointed ministers under the chair of the prime minister or his/her appointed deputy prime minister. The main task of the board is to approve the plans, programs, and reports related to disasters and emergencies. The board operates under the control of a chair appointed by the president, and it convenes at least twice every year unless the chair requests an extraordinary meeting due to the emergency.

Disaster and Emergency Coordination Board: The board operates under the chair of the office of Undersecretary of the Prime Ministry, and consists of undersecretaries and organization executives who are responsible to the chair. The main task of the board is to evaluate information related to disasters and emergencies, to determine necessary measures, to ensure and inspect their implementation, and to sustain coordination with agencies, organizations, and NGOs. The chair has the authority to summon the board for an extraordinary event; but normally, the board convenes at least four times a year.

Earthquake Advisory Board: AFAD is the chair of the board, and the assigned representatives operate under the authority of AFAD. The main task of this board is to set “priorities and policies for earthquake-related researches, and to suggest activities for earthquake protection, mitigation of earthquake-related damage and losses, and activities to be carried out after earthquakes” (AFAD 2013a).

AFAD Organization Chart

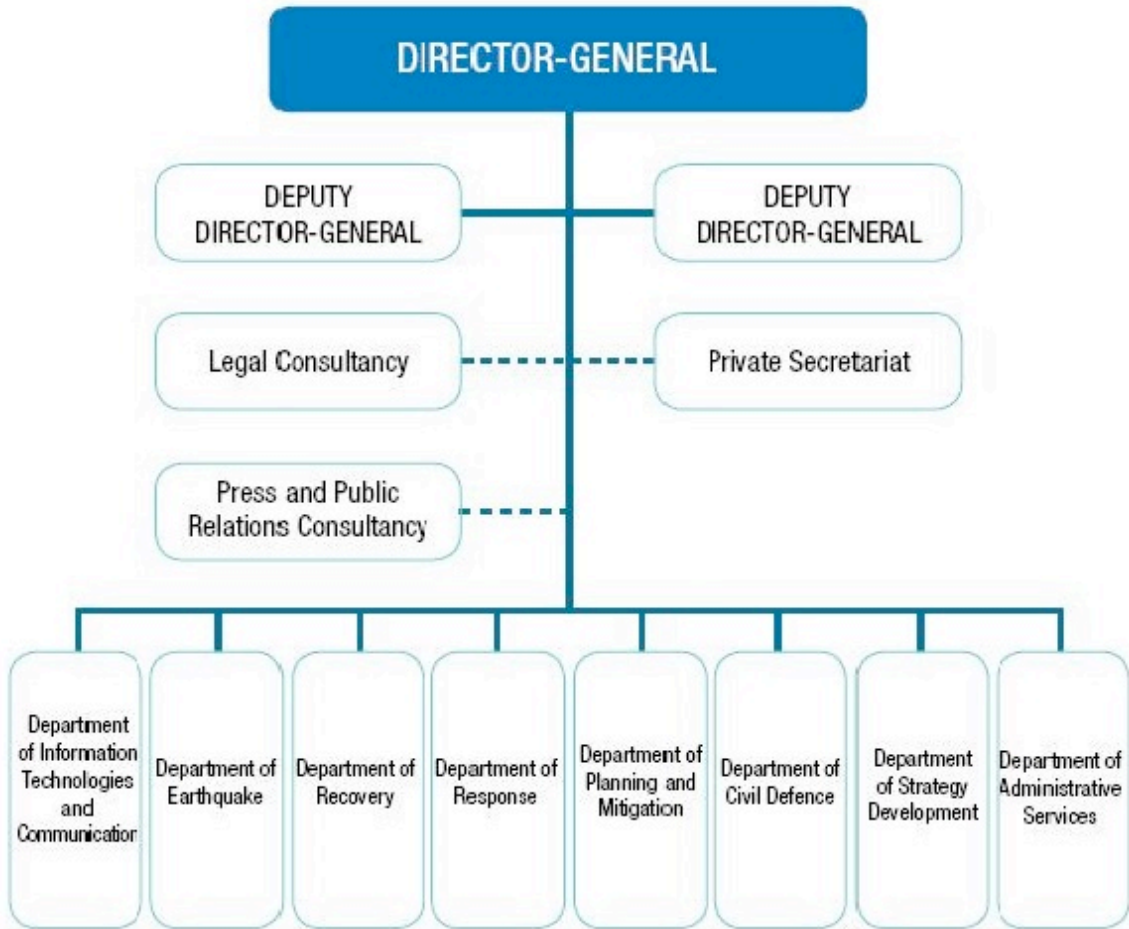


Figure 7. AFAD Organization Chart (from AFAD 2013a)



Figure 8. Disasters and Emergency Supreme Board (from AFAD 2013a)

b. Local Level

Before 2009, the local level disaster-management systems were inconsistently showing variations within the provinces of Turkey. Despite the strict centralized authority, these lower-level disaster-management systems were acting as single and independent agencies with different principles and strategies. In fact, this irregular management problem showed up with devastating outcomes in 1999 after the catastrophic Marmara Earthquake.

Due to the need for a strong national disaster-management system, Turkey decided to restructure a more centralized and more standardized system that included both provinces and municipalities. The main goal here was to eliminate the different practices among local level disaster-management authorities, and support the strategy and plans of the national level disaster management system with local governors and the resources under their control.

The disaster management strategy of Turkey defines four main disaster levels (see Table 2), which require four different reactions. The first two levels require local reaction in the initial response phase, whereas the following two require more complex and detailed responses, such as national and international levels (AFAD 2013b).

Table 2. Disaster Level and Responsibility

Level	Response	Responsible Authority
L1	Local capabilities are enough	The Provincial Disaster and Emergency Directorate
L2	Needs support from other provinces	The Provincial Disaster and Emergency Directorate + Responsible Supportive Provinces
L3	Needs national support	Responsible Supportive Provinces + National Capacity
L4	Needs international support	Responsible Supportive Provinces + National Capacity + International Support

Provincial Level: The provincial governors are directly responsible for the preparation of provincial emergency plans in accordance with national level plans. They coordinate and oversee the implementation and monitoring of emergency and response plans in times of disasters. The local disaster management organizations under the command of local governors determine the hazards and risk at a provincial level, and they operate the provincial disaster and emergency management center, which performs damage and loss assessments. Finally, these organizations carry out social awareness programs as well as joint trainings with NGOs and other voluntary groups (AFAD 2013b).

Municipal Level: Similar to provincial level, the governors of municipalities are responsible for the compatibility and feasibility of local disaster management plans with the provincial and national level plans. Municipalities have the role of coordination, arranging and implementing mitigation, prevention, and risk reduction activities in addition to preparation and implementation of master plans (AFAD 2013b).

2. National Disaster-management Strategy

The main strategy of Turkey's national disaster management is based on a centralized organizational structure whose strategic view is composed of:

- Mission and Vision
- Key Success Criteria and Performance Criteria
- Values, Principles and Policies
- Goals and Objectives (AFAD 2013a)

a. Mission and Vision

Due to the fact that Turkey is a high-risk country in terms of natural disasters, the AFAD states its main mission as “building a disaster-resilient society.” It is fairly hard to prevent earthquakes, floods, landslides, rock falls, droughts, storms, tsunamis, and many other disasters that have devastating effects on people, the environment, and the economy; however, it is possible to form a structure that is able to respond quickly to mitigate the devastating effects of these events on people and locations. Establishing this resilience will minimize the post-disaster damage by maximizing the efforts and the resources that will be used for relief operations. In summation, AFAD's motto is: “we are prepared for the unexpected.”

b. Key Success Criteria and Performance Criteria

AFAD uses some rubrics in order to control and assess its organizational effectiveness. One of these charts is Key Success Criteria and Performance Criteria. This criterion is the golden tool for AFAD to improve its efficacy by considering the lessons learned from experienced events. These criteria are provided in Figure 9.

KEY SUCCESS CRITERIA	PERFORMANCE CRITERIA
1. Raising Disaster Awareness Among Citizens	20% increase every year
2. Increasing Disaster Preparedness Among Citizens	10% increase every year
3. Raising Disaster Awareness Among Agencies and Organizations	20% increase every year
4. Increasing Disaster Preparedness Among Agencies and Organizations	10% increase every year
5. Increasing Satisfaction rate from Disaster Coordination Among Main and Auxiliary Solution Partners	10% increase every year
6. Increasing Satisfaction rate from Responses Among Citizens After Disasters	10% increase every year
7. Increasing Satisfaction from Recovery Works Among Citizens After Disasters	20% increase every year
8. Increasing AFAD's Positive Coverage in News in the Media	20% increase every year
9. Increasing Satisfaction rate Among AFAD Employees	20% increase every year

Key Success Criteria And Performance Criteria

Figure 9. Assessment Criteria Chart (from AFAD 2013a)

c. Values, Principles, and Policies

The AFAD sets its main value at ensuring integrity and unity of the personnel in their jobs and relations. The value-based staffing policy of the AFAD helps it create more value in its operations, and build stronger loyalty and identification among its employees. For the same reasons, AFAD regards its employees as the most vital and crucial resources.

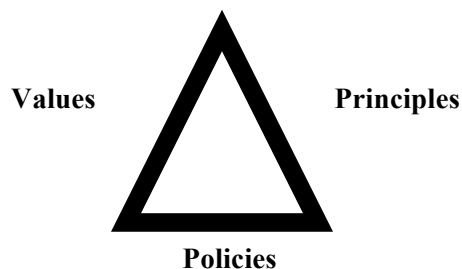


Figure 10. Three axes of AFAD's Planning Table (after AFAD 2013a)

d. Goals and Objectives

AFAD claims that it has a “fully correct reading of the future” based on the information acquired from these works and estimations.

The main goals and objectives are as follows:

- Being a constantly developing and learning organization
- Establishing a risk-centered integrated disaster management system
- Generalizing disaster management standards
- Launching out an educational campaign for disaster preparedness
- Being a leading organization in the international arena (AFAD 2013a).

3. National Disaster Management Plans

The kind, number, and impact of disasters increase in parallel to the changes in environment, demography, climate, and social and economic indicators of the evolving world. As the central and commanding organization, AFAD aims to alleviate the effects of these changes through an Integrated Disaster Management System in Turkey. “The main founding purpose of AFAD is to ensure the most effective execution of the integrated disaster management system before, during, and after disasters and emergencies, and in this sense to ensure high-level national and international coordination in this context” (AFAD 2013b).

AFAD focuses on four main criteria such as: reducing losses from disasters, ensuring disaster preparedness, ensuring disaster response, and promoting fast recovery. To meet its target criteria, AFAD:

- “Cooperates with all relevant national and international agencies and organizations for effective planning, management, support and coordination of necessary activities in line with specified standards,
- Promotes disaster awareness and culture in the public by carrying out research, development and education activities,
- Ensures that protective and preventive measures are taken within the framework of the principle of social state” (AFAD 2013b).

AFAD conducts the following tasks that are mandated by the United Nations regarding the disaster risk reduction and development plans:

- “Collection of necessary basic data on disaster risks and development of planning tools so as to monitor the relationship between the development policy and disaster risk,
- Collection and dissemination of data required for making the best and most effective development plan and policy to reduce disaster risk,
- Re-orienting development and disaster risk reduction sectors, mobilizing and warning the public” (AFAD 2013b).

4. Van Earthquake and Response

On Sunday, October 23, 2011, at 10:41 GMT (13:41 Local), an earthquake whose magnitude was 7.2 (Mw), and whose depth was 19 km, hit the Van province in Turkey. “Kandilli Observatory and Earthquake Research Institute (KOERI, www.koeri.boun.edu.tr/sismo/indexeng.htm, ww.kandilli.info) reported that the earthquake originated at a depth of about 5km, and that the epicenter was located at 43.36 N 38.76 E, at the village of Tabanlı, between the major cities of Van and Erciş” (Erdik et al. 2011).

The population of Van in 2011 was 1,022,532 (1.4 percent of the population of Turkey), with a population of 363,419 (municipal), 526,725 (total). Erciş was reported to have a population of 76,473 (municipal), and 159,450 (total) (Turkish Statistical Institute 2011).

The effects and losses of the disaster were catastrophic. AFAD reported the outcomes as 604 fatalities and 2,608 injuries (Afet ve Acil Durum Yonetim Badkanligi, n.d.). There was also a subsequent earthquake, 5.6 (Mw) in magnitude and 5km in depth, which resulted in the collapse of two big hotels, with 40 additional fatalities. In addition, 33,016 buildings, 28,532 housings, 2,440 workplaces, and 8,254 yarns were collapsed or severely damaged.

Experts estimated the cost of these earthquakes at approximately 1–2 billion U.S. dollars (Afet ve Acil Durum Yonetim Badkanligi, n.d.).

The response phase started with search-and-rescue operations within the first 6-hour period after the earthquake, all of which were coordinated by the AFAD. Due to the high significance level of the earthquake, AFAD responded to the disaster with the help of the local disaster-management organizations of supportive provinces, as well as military, Red Crescent, volunteers, and NGOs. The numbers of these response teams increased throughout the 72-hour response period. The numbers of response phase are as follows:

- 140 response teams with 5,267 staff in total
- 2,976 medical staff
- 201 ambulances
- 11 mobile field hospitals
- 76,802 tents
- 80 Turkish Airlines, 76 military and 20 private cargo planes
- Search and rescue and first aid teams from 48 provinces and 39 organizations (Afet ve Acil Durum Yonetim Badkanligi, n.d.).

The Turkish military was in close coordination with AFAD since the very beginning of the Van earthquake. Immediately after the earthquake, the Department of the Chief of Staff inaugurated the Natural Disaster Management and Coordination Command in Van and its affected county of Ercis. This command coordinated the operation of military activities with AFAD and other organizations. Based on the needs of the relief operations, the Department of the General Staff assigned the DAK (Natural Disaster Search and Rescue Team) battalion, in addition to the support of the JOAK (Gendarmerie Special Search and Rescue Team) battalion to provide logistics support, 19 military cargo airplanes, and 14 military utility helicopters were assigned under the command and control of these teams.

After the initial response, and due to the increased demands, six battalions on September 23 and five battalions on September 24 were assigned to the region for the tasks of transportation, search and rescue, security, debris disposal, first aid, tent set up, and distribution of aid supplies.

The assigned helicopters operated 154 sorties, and transported 200 wounded and patients to both military and governmental hospitals in sum. Similarly, military cargo planes operated 140 sorties in order to transport 415 tones supplies, medical equipment and food, as well as the 292 search and rescue personnel, and 2378 military and civilians affected to the west part of the country (Turkish Armed Forces n.d.a).

Additionally, Azerbaijan, Mexico, Iran, Spain, France, Belgium, Japan, Sweden and Malaysia attended search and rescue operations with two teams; namely, 12 international teams joined in the response phase after the Van earthquake (Provincial Secretariat of Van 2012).

During the response phase several problems emerged which can be classified as pre-disaster and post-disaster failures. During the pre-disaster phase, the zoning and planning layout of Van was insufficient to deal with the potential earthquakes. Since Van is located on a critical tectonic plaque vulnerable to earthquakes, the inadequate urbanization and agricultural landing aggravated the effects of seismic waves moving on these settlements. One other pre-disaster problem was the poor construction and infrastructure of the city. For example, only 15 percent of approximately 60,000 structures had a legal license and architecture signature in Van just before the earthquake. The risk awareness and basic disaster training of residents were fairly weak for a successful individual response. All these aspects show the failure of local regulations as well as governance and legislative insufficiencies that were intensified by weak control and coordination.

In all disaster-management cases, the most vital failures generally occur within the first 72 hours of the response phase. Likewise, the post-disaster failures regarding the Van earthquake occurred mostly during the initial response and included the following:

- Failure to sustain order among the chaotic population caused tyranny and looting in the region. This turmoil prevented search-and-rescue teams from detecting and marking the damaged buildings and cleaned zones.
- Failure to make correct estimations about the amount of provisions, supplies, vehicles, and tents caused many people to suffer physically in addition to their psychological stress.

- Failure to pre-determine potential warehouses and storing places caused ineffective allocation of supplies that came from all around the country.
- Failure of AFAD, as a leading organization during the disaster, to coordinate and utilize the efforts of other organizations, military forces, and volunteers caused prolonged waiting times for transportation of manpower, relief provisions.
- Failure to establish a local crisis desk caused imperfect and incomplete information flow, which misled the AFAD's executive board at its headquarters.
- Unprepared local teams and uneducated local people subverted the situational awareness by creating chaos and disorder during the response.
- Having only local response plans, which did not include possible additional teams and organizations from national and international level, caused many resources as well as manpower redundant and ineffective. The inflexible plans did not let imminent alternative actions get included to the current response (Erdik et al., 2012; Turan 2012; Mehdi and Nazamar 2013).

C. THE U.S.A.

With a changed environment following the 9/11 attacks, the U.S. government adopted a new “all hazard” approach. The Homeland Security Act⁸ led to creation of Department of Homeland Security (DHS). A new department was made responsible for dealing with all internal threats to the country. Twenty-two agencies, including the Federal Disaster Management agency (Figure 11), were placed under the control of the DHS, and hence it became responsible for disaster management at the federal level.

⁸ *The Homeland Security Act (HSA)* of 2002, Public Law 107-296, *U.S. Statutes at large* 116 (2002): 2135, http://www.dhs.gov/xlibrary/assets/hr_5005_enr.pdf

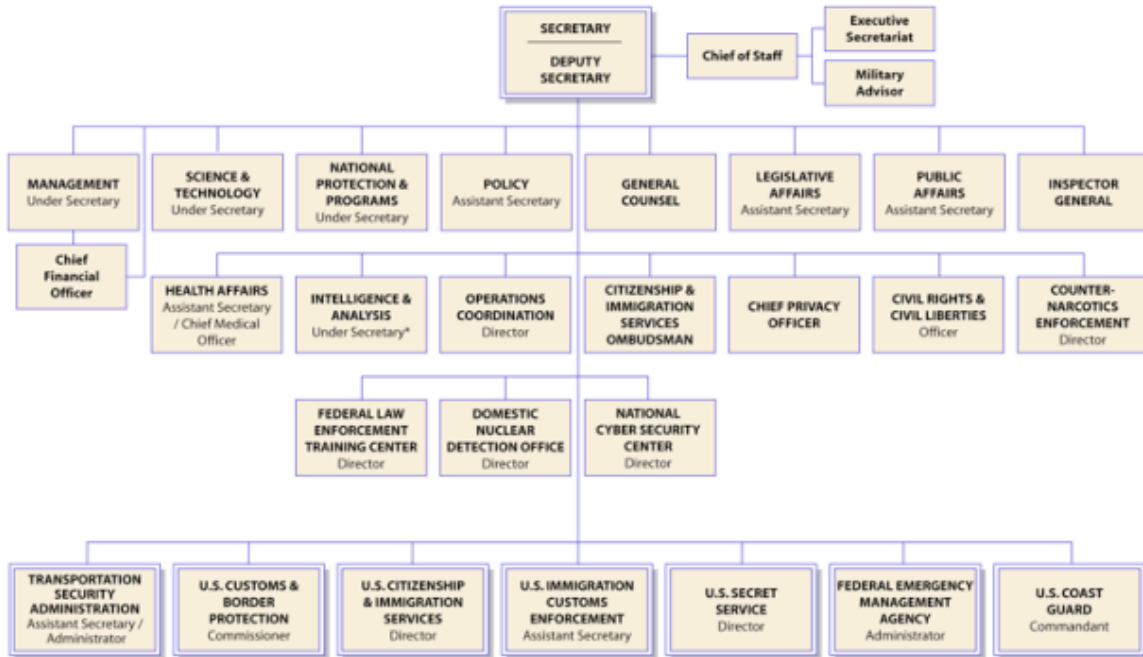


Figure 11. DHS organizational Chart (from DHS, n.d.a)

1. Organization of Disaster-management System

As a relatively mature organization in comparison to AFAD and NDMA, FEMA has a unique and quite effective organizational structure to cover the needs and potential risk factors of the U.S. domestically, and to provide foreign support when requested. FEMA has a decentralized structure that is beneficial in terms of fast and effective decision-making, planning, and response; however, it is also sluggish in terms of funding, budgeting, and appropriations of the organization.

a. Organization Structure

The U.S. disaster-management system is organized to function based upon the guiding principles of engaged partnership, tiered response, scalable/flexible/adaptable capabilities, unity of effort through unified command and readiness to act (DHS 2008a) without a hierarchical structure. It includes administratively independent disaster response agencies at federal, state, and local levels. FEMA is the agency responsible for coordinating, streamlining, and executing disaster response at the national level.

b. Organizations and Their Functions

FEMA is the lead agency for emergency management at the federal level. FEMA states its mission as “to support our citizens and first responders to ensure that as a nation we work together to build, sustain and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards” (FEMA 2014a). Goals set forth to fulfill its mission include:

- Lead the nation’s disaster management efforts
- Partner with other stakeholders (states, local governments and other agencies) to build a national emergency management system
- Develop federal emergency response capability
- Integrate agency’s emergency management responsibilities for effective response to all types of disasters
- Develop and maintain regional offices to work with local authorities to identify and address local needs
- Provide funding, training, technical, and other assistance to build national, state and local level capabilities to deal with disasters
- Develop and coordinate implementation of all hazard risk based disaster management strategy (DHS, n.d.b).

As of October 2011, FEMA has 7,474 employees, including managers and emergency workers at its headquarters, and 10 regional setups (FEMA 2014a). For year 2010/2011 FEMA’s annual budget allocation, excluding USD 4.1 billion program grants, was USD \$6.18 billion (DHS 2011). The organizational structure of FEMA is shown in Figure 12.

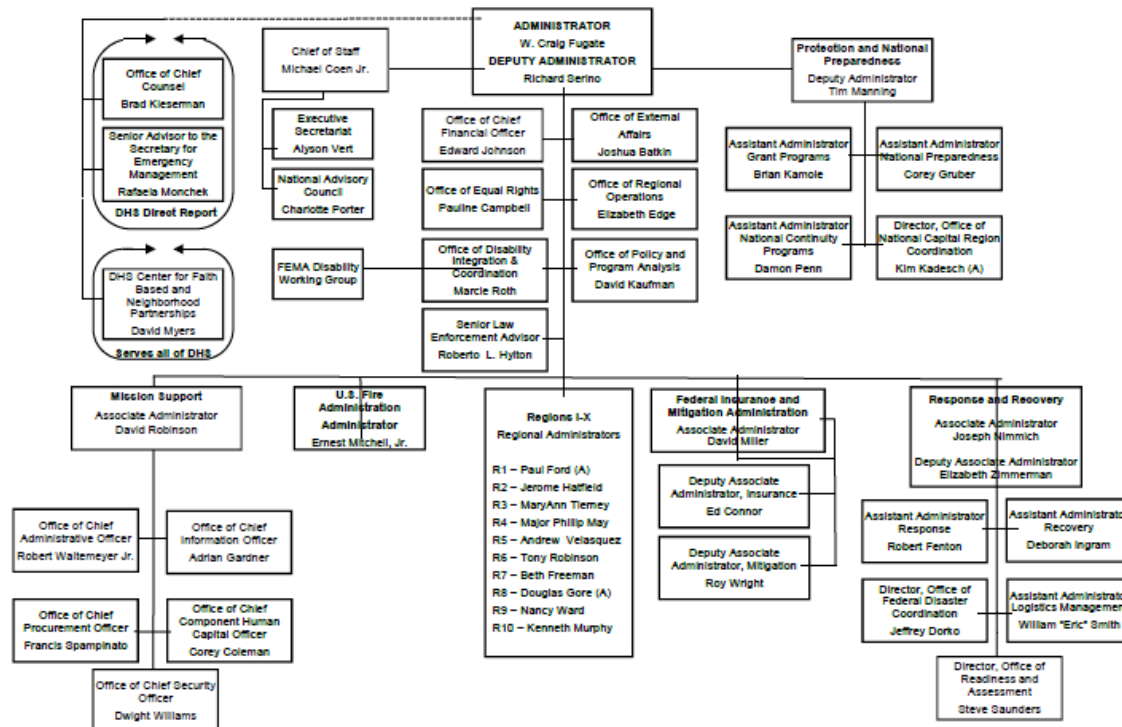


Figure 12. Organizational structure of FEMA (from FEMA 2013a)

State Emergency Management Organization: Each state has an emergency management office. This department may be located in the governor’s office, in the department of public safety, or can be a stand-alone agency, or integrated into state homeland security departments. State emergency management departments rely upon federal funding for their emergency management budget as a homeland security function (NEMA, n.d.). Their role generally parallels the role of FEMA at the federal level.

- Perform and maintain the provisions of emergency management legislations
- Work to improve emergency management in the state
- Supplement, support, and guide local emergence management efforts
- Prepare and maintain state emergency management plans and a state emergency operations center
- Ensure implementation of national emergency strategy prepared by DHS / FEMA (FEMA 2014b)

Local Emergency Management Organizations: Being closest to the scene of the incident, local governments (county and municipal) are the first ones to respond to any emergency. If the scale and scope is limited, their emergency management resources may be the only ones to be activated. A local emergency management office may vary in size depending upon the size of the jurisdictions. It may follow the pattern of the state government. That is to say, it may be integrated into other departments such as the fire department, the police department, or public works (McEntire, n.d.), Roles of a local emergency manager or department include:

- Advise and inform local chief executive on emergency management
- Advocate for disaster-related laws, policies and regulations
- Coordinate and support functioning of emergency services
- Lead disaster management planning efforts at local level
- Maintain local emergency operation Centre
- Emergency management training and preparedness exercises
- Promote emergency management awareness
- Implementation of federal and state emergency management guidelines (FEMA, n.d.)

Other Stake Holders: There are hosts of other departments and agencies that work with the emergency managers at various levels for disaster management. Some of these are:

- Department of Defense
- Department of Energy
- Department of Education
- Department of Housing
- Department of Transportation
- Department of Justice
- Department of Interior
- Social Security Administration
- Social Benefit Administration
- Office Personnel Management
- NGOs, etc.

2. National Disaster Management Strategy

At the time of Hurricane Irene, the National Response Framework 2008 (DHS 2008a) was the key document which laid down the guiding principles for all response partners for preparation and response during disasters; it included response doctrines and discussed other important aspects, such as roles and responsibilities, response organizations, and guidelines regarding planning. Response doctrine is based upon the following six key principles.

- **Engaged Partnership** expecting the leader across the emergency management system to communicate and support engaged partnerships by developing shared goals and aligning the capabilities of partner organizations to prevent any one component being overwhelmed in the course of a disaster
- **Tiered Response** requiring disaster management to begin at lowest possible level and provide for additional capabilities when needed
- **Scalable, Flexible, and Adaptable Operational Capabilities** highlighting the need for building the capabilities that could be adjustable to the nature and scope of the disaster.
- **Unity of Effort Through Unified Command** by developing common objective and goals ensuring effective coordination and optimum utilization of all available resources while respecting the authority and responsibilities of each partner.
- **Readiness to Act** by keeping abreast with the scope/size of risk and being suitably positioned to get into action when needed (DHS 2008b)

3. National Disaster Management Plans

The National Incident Management System (NIMS) is another important document pertaining to disaster management in the U.S.A.. Its main purpose is to provide a uniform disaster-management framework by offering a consistent approach for tackling disaster incidents. The underlying principles of NIMS are flexibility and standardization, which makes it a useful tool at all levels of response from local authorities and states, as well as federal agencies irrespective of the magnitude of the incident. Standardization helps in cooperation and integration of resources coming from various governmental and non-governmental disaster response providers. Being a template, it enables specific agencies and authorities to prepare respective action plans according to the specific

environments and the resources available. There are five interlinked components covering best disaster management practices to make up a system approach. These include:

- Preparedness
- Communication and information management
- Resource management
- Command management
- Ongoing management and maintenance (FEMA 2008)

4. Hurricane Irene and Response

Irene was the first hurricane that hit the United States since Hurricane Ike in Texas, in September 2008, and it was the first storm that affected the New York City area since Hurricane Gloria in September 1985 (NOAA 2011b). Irene was similar in size to Hurricane Katrina, whose hurricane force winds extended outward about 104 miles with tropical storm force winds felt up to 230 miles. Similarly, Irene's hurricane force winds extended outward up to 90 miles from the center, and tropical storm force winds extended outward up to 290 miles (Spotts 2011).

The effects of Hurricane Irene were felt from the U.S. Virgin Islands and Puerto Rico to the Canadian Maritime Provinces, and as far west as the Catskill Mountains of New York. The storm produced widespread, devastating flooding in Vermont, New York, New Jersey, and parts of New Hampshire and damaging storm surge along the coasts of North Carolina and Connecticut (NOAA 2011c).

As for floods, 26 rivers deluged into eight in New Jersey, 14 in New York, and four in Vermont (CIESEN, Columbia University). Irene caused widespread destruction resulting in about \$15.6 billion just in the United States, and at least 56 deaths (NHC 2012), which made it the seventh costliest hurricane in United States history, ranking behind Hurricane Andrew in 1992, Hurricane Ivan in 2004, Hurricanes Wilma and Katrina both in 2005, Hurricane Ike in 2008, and Hurricane Sandy in 2012. The financial costs of Irene in the Caribbean and Canada were \$830 million and \$130 million, respectively, for a total of almost \$16.6 billion in damages (Fieser 2011; ICLR 2012). According to the records of Columbia University, 80 million people were within the 200

mile-range of the storm, and 49 million of them were within a 100 mile-radius, and were seriously affected in terms of utilities such as electricity, water, and gas. Additionally, 2.3 million people were forced to evacuate their homes and lands, including one million in New Jersey, 315,000 in Maryland, 300,000 in North Carolina, 200,000 in Virginia, 100,000 in Delaware, and 300,000 people in New York City. Moreover, more than 10,000 flights were canceled between August 27 and 28, and many roads were closed in the affected areas. As a result, Hurricane Irene became the tenth billion-dollar disaster in 2011 by breaking the annual record dating back to 1980 (NCDC 2013).

FEMA was in close contact and coordination with the affected locations through its offices in Boston, Philadelphia, New York City, Atlanta, and even in Puerto Rico. After the declaration of emergency by the government, a response administration was assigned under FEMA to gather and allocate resources of the federal government. As per the requirement of response, FEMA deployed teams to both Puerto Rico and the U.S., and without losing time FEMA commenced to collaborate with federal, state, territorial, tribal, and local partners, as well as voluntary organizations, the private sector, and others to prepare for potential impacts of Hurricane Irene and to mitigate its outcomes (FEMA 2011).

Friday, August 19: FEMA began closely monitoring the large tropical wave that eventually strengthens into Hurricane Irene. FEMA's mission was to support citizens and responders to aggregate all the national efforts in order to utilize the capability and maintain the preparation, response, protection, and mitigation in pre- and post-disaster phases (FEMA 2012).

Saturday, August 20 and Sunday, August 21: New York and the Caribbean Area Offices of FEMA carried out their contact and coordination with the U.S. Virgin Islands Territory Emergency Management Agency and the Puerto Rico Emergency Management Agency. Liaison officers and expert personnel who worked directly with territory and local officials conducted this coordination and contact. Granted, FEMA had many federal resources such as millions of liters of water, millions of meals and hundreds of thousands of blankets, strategically located at distribution centers throughout

the United States and its territories. Also, FEMA strategically located some of these resources in Puerto Rico, for example, more than 200,000 liters of water, more than 400,000 meals, and more than 1,400 cots and blankets were all located just in case of worst-case scenario (FEMA 2012).

Monday, August 22: FEMA stayed in close contact and formed a strong information network with governors and response teams in the U.S. Virgin Islands and Puerto Rico, while they conducted response efforts and damage assessments of the hurricane. Depending upon its processed data and surveillance, FEMA started to create contacts with emergency management officials along the east coast and other states that were under threat. The high-ranking officers of FEMA conducted daily calls with their regional offices, the governors of the states and territories affected or under threat. FEMA's Regional Response Coordination Center in New York served as a coordination center to optimize the efforts of response as well as to minimize the destruction of hurricane. In order to enhance this process, FEMA activated a National Response Coordination Center for carrying out 24-hour operations by closely monitoring the data related to the hurricane (FEMA 2013b).

Tuesday, August 23: FEMA teams were deployed to staging areas in Georgia and Pennsylvania upon their predictions regarding the potential impact areas along the east coast of the U.S. Simultaneously, FEMA administrators, and their federal partners, carried on informing the governors of the states and territories affected or under threat (FEMA 2013).

Wednesday, August 24: Fort Bragg, North Carolina, was assigned as an Incident Support Base to coordinate federal response operations to Hurricane Irene. This base was crucial for FEMA and its partners to effectively deploy equipment and provisions nearby the affected areas, which made the transportation and logistics networking process quicker and less costly. Besides, The U.S. Army Corps of Engineers deployed the personnel of the 249th Engineering Battalion (Prime Power) to Puerto Rico to assist with restoring power to the island. In addition, The National Guard Bureau was also assigned in Puerto Rico to support clearing of the roads and debris, to transport equipment, to provide communications, and to carry out urban search and rescue efforts as well as

public safety and security needs. FEMA and the military were in coordination with The National Oceanic and Atmospheric Administration's (NOAA) National Hurricane Center, which was monitoring Hurricane Irene. In addition, U.S. NORTHCOM and U.S. Coast Guard (USCG) deployed personnel to Puerto Rico for assisting the response operations (FEMA 2012).

The American Red Cross attended relief operations by forming volunteer teams assigned to North Carolina and South Carolina, and by sending food and communications equipment to east coast states. Moreover, the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS) handled the task of informing residents about the potential threats and effects of hurricane in order to minimize the potential for foodborne illnesses in the event of power outages, flooding, and other problems that could be associated with the storm (FEMA 2012).

IV. ANALYSIS

Disasters are diverse and wide-ranging phenomena. It is not the frequency of occurrence, but the unfortunate outcome that brings varying types of incidents under the common title of disaster. Another characteristic is the variation in magnitude of disaster that affects the outcome. Yet when a disaster of similar nature and magnitude hits different geographies and terrain, the outcomes may have great dissimilarities. Similarly, there is great variation in the approach to handling and managing of disaster response in different countries and societies. These differences are linked with the state of progress, prosperity, and societal norms. These sources of variation make an objective comparison between disaster management in different countries very difficult. However, we can always look at the parts within different systems to get an understanding of similarities and differences with respect to disaster management in approach and handling of disasters.

A. EVOLUTIONARY PROCESS OF DISASTER MANAGEMENT SYSTEM

There appears to be a major difference as to how the disaster-management systems in the U.S., Turkey, and Pakistan took shape and achieved their current structures. In the case of the U.S., it has been a gradual evolutionary process based upon the realization of the deficiencies of incumbent systems that led to current disaster management procedures, mechanisms, and the organizational structures. In the case of both Turkey and Pakistan, where for a large part of their modern existence, a reactive approach remained the dominant norm, it was only a devastating disaster striking each country in the beginning of the twenty-first century that caused them to change and adopt a comprehensive disaster management approach and organizational structures that could meet the requirements thereof. Models adopted in the two countries are similar and bear the marks of guidance and support of the UN and other international disaster-management organizations. Though comprehensive, a model may not be very effective due to the lack of necessary capacities and skills at various levels, which will require large resources and time to build.

1. Disaster Management – Organizational Structure

Disaster-management systems in the three countries under consideration follow a similar pattern. They all revolve around multi-tiered disaster management capacity beginning from local level and going up to state/province and ultimately the federal/national level. Despite similarity in approach, there is much difference in the effectiveness of these structures. In the case of the U.S., a whole structure actually grew up from the local level, and hence, there is sufficient emergency management and a capacity (proportionate to population and resources) to exist at a county, town, and city level. Turkish and Pakistani disaster-management systems also identify the importance of local-level response as a starting point for all disaster-management activities. That said, required emergency management departments either do not exist or lack physical capacity at a local level. This lack of capacity was observed during the floods of 2010 and the Van earthquake, resulting in overdependence on other players, such as armed forces for emergency response, and other countries and international organizations for subsequent assistance. A glaring example with regard to lack of capacity is absent in dedicated disaster managers at local levels; hence, administrative officials are assigned this responsibility as an additional task.

2. Approach To Disaster Management

A great deal of difference exists in how disaster management is approached as a function. In the U.S., it is reflected as an important subject, and emergency management-related requirements are considered important factors when making decisions. This ensures relevant safety requirements are built in all private projects, whether small or large. A greater emphasis on disaster mitigation ultimately saves efforts required for disaster management, relief, and rehabilitation. In the cases of Turkey and Pakistan, although the prevailing disaster-management laws entail disaster mitigation as planning considerations for all developmental projects, they are far from being fully practiced. This issue is even more neglected in private projects. The root cause of problems is partially linked to the lack of realization of the possible sufferings and losses, but to a greater extent to the resource constraints. With limited resources available, disaster

management falls very low on the agenda of government and the public both trying to either fulfill more fundamental requirements or achieving short-term goals. A consequence of the difference between the two approaches is apparent from the huge difference between quanta of losses sustained during disasters in all countries.

B. NATIONAL DISASTER MANAGEMENT AGENCIES

Whereas FEMA was built upon the Civil Defense Agency to coordinate disaster management functions at federal level, the AFAD and NDMA are altogether new creations created in the wake of a major disaster more recently to develop a capacity for handling the next disaster. Notwithstanding the agency maturity factor linked with respective operational lives, there are several other contexts that can be used to analyze relative efficacy, strengths, and weaknesses.

1. Position Within Government Structure

As part of DHS, FEMA is responsible to the U.S. President through the Secretary of DHS. The AFAD and NDMA are independent agencies directly responsible to the chief executive and Prime Minister in both Turkey and Pakistan. A shorter chain of command makes it easier for the disaster management agencies of Turkey and Pakistan to obtain strategic direction, as well as rallying the resources of other federal governmental department during any disaster management operation. The direct link with the chief executive technically also facilitates securing federal budget as opposed to the second case, where FEMA first has to compete for required resources at the DHS level.

2. Agency Structure

FEMA has a decentralized structure as compared with the AFAD and NDMA. It has a central office to look after the centralized functions, as well as regional offices for conduct of disaster-management operations in respective areas of responsibility. Regional offices enhance the agency-level understanding and preparedness regarding specific needs as well as the speed with which it can react to any situation. Presence of regional offices also improves the coordination and liaison with state and local disaster management agencies. In the cases of Turkey and Pakistan, AFAD and NDMA are

totally centralized agencies with no regional offices and therefore dependent upon the provincial and local governments for information regarding situation as well as conduct of disaster management activities.

3. Role of National Disaster Management Agencies

The primary role of FEMA, AFAD, and NDMA is to act as the lead disaster management agency for their respective countries. Accordingly, they have a number of similar roles revolving around:

- Coordination of disaster-management effort at federal/national level
- Capacity building of state/provincial and local disaster management agencies
- Technical assistance to state/provincial and local disaster management agencies
- Development of disaster management guidelines and standards
- International disaster management cooperation
- Promoting risk management monitoring, preparation and implementation

In addition to these important roles, FEMA is also assigned to build federal disaster management capability and maintain regional offices. Manifestation of these roles enables FEMA to have dedicated disaster management resources, making it an executing agency in addition to planning and coordination functions. This capability makes FEMA a more potent emergency management agency as compared to AFAD and NDMA.

4. Disaster Management Capacity

Notwithstanding the organizational structures and the work process, the capacity of any organization can be the most important limiting factor regarding its ability to fulfill its objectives. There are two important factors that contribute to the capacity of a disaster-management agency, which are manpower and the budget. The budget enables or prevents the organization from developing and maintaining sufficient disaster management skills, infrastructure, and equipment. A comparative state of manpower and the budget of three agencies during the year when Hurricane Irene, Van Earthquake, and

the Flood of 2010 struck, reveals significant disaster management capacity in each case. The data provided in Table 3 highlights comparative understaffing and resource constraints of the AFAD and NDMA for undertaking effective disaster management.

Table 3. Comparison of Manpower and Standing Budget

Agency	Manpower	Staff per million citizens	Budget (millions in local currency)	% of national budget
FEMA	7474	24.26	6180	.16
AFAD	283	3.77	688,042	.0025
NDMA	21	.17	65	.0027

C. DISASTER MANAGEMENT DURING SPECIFIC CASES

Hurricane Irene, the Van Earthquake, and the Flood of 2010, truly reflect a possible variation in the nature of disasters. All of them affected sizable populations including 49 million in the U.S., one million in Turkey, and 20 million in Pakistan, and inflicted huge losses of life and property. While an earthquake is a spontaneous event, hurricanes and floods take a longer time to develop and gradually move through different affected areas. In spite of various differences in nature and magnitude, some comparison pertaining to a disaster-management effort by respective national disaster-management agencies during said disasters.

1. Mitigation

Hurricane Irene: It is not possible to predict the course of a hurricane and area likely to be affected before it starts developing; losses can only be minimized through effective mitigation measures. Out of 49 million people affected by Hurricane Irene, 56 died. This relatively small death toll reflects the effectiveness of disaster mitigation efforts of FEMA, which revolves around greater awareness and building codes, as well as evacuation of 2.3 million people from threatened areas.

Flood of 2010: Flood affected areas are easier to predict as they are mostly the same low lying areas along the rivers and other waterways, and hence, easier to plan for. However, during the flood of 2010, 1985 persons out of 20 million affected population died whereas 0.8 million had to be rescued in the event, and nearly 1.7 million houses collapsed due to flood water, all highlighting lack of required attention regarding disaster mitigation. These losses could have been minimized through settlement controls, effective building codes, as well as greater public awareness regarding likelihood of floods in their areas.

Van Earthquake: A large number of deaths and destruction of houses can be attributed to poor building controls again reflecting a lack of disaster mitigation.

2. Response

Performance of a disaster management system during the response phase can also be measured from the role played by various components as well as the swiftness with which required assistance was provided to the affected people.

Hurricane Irene: During the response phase, all components of the U.S.A.'s disaster management system played an active role to support the affected population. Salient features of operation during said period revolved around:

- Lead role played by FEMA, who started monitoring the situation right from the development stage of hurricane.
- Information actively shared within FEMA and the states likely to be affected by the calamity.
- Consistent coordination between FEMA, state governors, and states' disaster-management agencies
- Pre-positioning of relief resources closer to the likely disaster hit areas
- Constant liaison between regional offices of FEMA, state officials, and state disaster-management agencies
- Provision of large quantities of relief goods to those affected

Flood of 2010: When the flood of 2010 hit the NDMA had been operative for four years. The disaster moved gradually across the length of Pakistan inundating large parts of all four provinces. Due to a lack of effective disaster mitigation procedures and

activities, the response phase assumed greater importance needing a huge effort to help the people who were caught up in the floods. In our assessment the salient features of operations were:

- NDMA was the lead agency coordinating relief efforts at a national level
- Due to lack of its integral disaster management resources NDMA was mainly coordinating availability of resources to PDMAAs as well as activities of international agencies and non-governmental organizations
- Although PDMAAs provided necessary relief goods, due to their lack of capacity, Armed Forces had a lead role in search and rescue, as well as delivery of immediate relief goods to the affected people
- DDMAAs that were supposed to be the mainstay of disaster management efforts remained the weakest link due to lack resources in terms of disasters managers and field workers
- Being a small and centralized agency, NDMA could not focus beyond the areas already affected by flood wave, hence necessary safe guards and preparations in downstream areas could not be undertaken. Said deficiency resulted in an otherwise avoidable larger requirement of emergency effort
- System still b in infancy stage had control and coordination issues involving NDMA as well as PDMAAs and other federal departments
- Lack of public awareness, effective warning system, and timely evacuation from affected areas increased requirement of search and rescue as well as relief assistance

Van Earthquake: The earthquake affected a relatively smaller geographic area. There was no pre-disaster warning, which can be attributed to the very nature of the disaster as well as advanced seismic activity monitoring capability. At the time of the disaster, AFAD had been in operation for only two years. In our assessment, salient observations regarding disaster response are:

- AFAD was lead disaster management agency
- Lack of sufficient disaster mitigation in face of degree of disaster vulnerability was the major cause of fatalities and losses owing to inadequate settlement planning, poor building controls, and lack of public awareness
- Inadequate and inflexible local disaster response plans prevented timely, effective, and optimal utilization of additional resources
- Gaps in coordination and poor information sharing can be attributed to ineffectiveness of incident command system which led to delays in

transportation of supplies, evacuation of casualties, and employment of disaster response teams

- Required disaster management resources were gradually brought into the disaster-hit area
- Armed forces played an important role in provision of search and rescue resources.

V. RECOMMENDATIONS

This chapter deals with recommendations for making natural disaster-management systems of Pakistan, Turkey, and the U.S. more effective. Most of these pertain to Pakistan and Turkey whose disaster-management systems have been found lacking in disaster-management approach, organizational issues, and resource allocation.

A. DISASTER MANAGEMENT APPROACH

Although all essential elements have been incorporated into disaster-management strategies and plans of Pakistan and Turkey, there is still a need to back up the policies with practical steps. These include:

1. Proportionate emphasis and resource allocation for disaster mitigation and disaster response. Effective disaster mitigation will not only reduce disaster-related losses/casualties but also cut down the resources required for disaster response.
2. Disaster awareness at the grassroots level should be adopted as the cornerstone of any disaster-management policy. It should be made part of education right from the beginning and incorporated/enforced on all private and public projects.

B. ORGANIZATIONAL ISSUES

Disaster-management structures of both Pakistan and Turkey are relatively new, and do not come up through the process of organizational evolution; therefore, these structures' components lack in organization, knowledge, experience, and capacity to work effectively and harmoniously during a major disaster. The following areas need attention in this regard:

- **Organizational Capacity:** Size of national disaster-management agencies needs to be increased in proportion to population and geographical area of the respective country and gradually brought closer to the FEMA standard.
- **Disaster Response Capability:** NDMA and AFAD should develop dedicated disaster-response capability and other organizations, i.e., armed forces to be used as an additional resource only.
- **Organizational Structure:** NDMA and AFAD should have a regional presence at the provincial/state level to ensure timely/swift response as

well as better coordination with provincial/state disaster-management agencies.

- **Disaster Management Training:** Conduct extensive training and exercises to make up for lack of experience, test the efficacy of plans and streamline procedures with provincial disaster-management agencies and other stakeholders.
- **Staffing at Lower Levels:** Being first respondents, district/local disaster-management agencies should be made effective through availability of dedicated and professional disaster managers/staff.
- **Disaster Response Capability at Grassroots Level:** Build disaster-response capability at the local level by supplementing and/or raising emergency services, including fire services and medical services.
- **Volunteers' Utilization:** Volunteers should be encouraged and trained to make up for shortage of dedicated emergency response workers.
- **Resource Allocation:** Standing budget of National Disaster Management Agencies of Pakistan and Turkey should be increased gradually. As an initial target, it may be raised to .05% of the national budget as compared to the current allocation of .16% for FEMA. Similarly, provincial/state, district, and local level disaster-management agencies should also have a standing budget.

VI. CONCLUSION

Even if they are not the most catastrophic, natural disasters are, however, the most unpredictable incidents that can dramatically affect the life routines of people. Moreover, many countries have international treaties or conventions and particular domestic precautions that are quite effective to prevent potential human-made disasters, such as threats from weapons of mass destruction, terrorist attacks, and biological threats from hostile countries. These measures are often effective because of the predictable patterns and controllable further steps of these kinds of disasters. Nonetheless, the issue becomes far more complicated when the agenda is an unpredictable incident like a natural disaster. Even worse, when the countries stay ignorant and poorly prepared, the post-disaster scenario becomes rather destructive and intolerable in terms of human life losses.

In this research, we studied three different countries' natural disaster-management systems at the national level. Two of them were Turkey and Pakistan, both of which had similar and novel systems adopted pursuant to UN conventions. The third one was the United States, which had a relatively mature and complex system in comparison to the other two.

We started our research with the general facts and definitions coming from history and underlying almost all types of natural disasters. Subsequently, we introduced the evolutionary development of natural disaster-management systems of these three countries in light of historical facts regarding the organizational formations of their systems.

The most salient finding we detected was the public awareness issue. All three countries suffered from destructive natural disasters in the recent past. While the United States had the ability to learn from the failures and history, the other two were slow to realize the urgency and importance of the same issue. Thus, this social ignorance and unawareness permeated the official handling of the disasters at the state level, and slowed down the establishment of strong disaster-management organizations in these two countries.

Throughout our analyses, we examined the structural and organizational differences among the national natural disaster-management agencies of these three countries. We observed that the organizational skeletons of the AFAD and NDMA were quite similar, because both Turkey and Pakistan modified their systems due to two common reasons. First, both experienced very destructive incidents such as the Marmara Earthquake of 1999 in Turkey, and the Kashmir Earthquake 2005 in Pakistan, showing that their disaster-management systems were significantly lacking in an effective response to those affected. Second, both countries' state authorities decided to take immediate action to do internal performance assessments and establish more resilient disaster-management organizations. At that point, these countries chose to literally adopt a model that was mandated to them by the UN rather than create a hybrid model that would cover both the requirements peculiar to each, and the conventions mandated by the UN. In fact, our further studies showed that this normative condition was true of the United States, because FEMA is a unique organization that was able to meet the requirements of U.S. contingencies in terms of logistics, response, manning, managing, and inter-organizational development.

After completing our research about the organizational structures of these three countries, we started to analyze the effectiveness of FEMA, AFAD, and NDMA in the cases of Hurricane Irene, the Van Earthquake, and the floods in 2010, respectively. In so doing, we researched how these organizations handled the response, and how effective they were in terms of a four-leg disaster-response cycle, consisting of preparedness, response, mitigation, and recovery. The outcomes of the case studies manifested that FEMA was sufficient and efficient enough to collect and reallocate resources to affected areas, and it successfully organized the local disaster-management organizations and NGOs to mitigate the post-disaster effects of hurricane. The only problem with FEMA was the flow time of the funds from the executive branch. For instance, while AFAD and NDMA served directly under the presidencies of Turkey and Pakistan, FEMA was under the lead of the U.S. Department of Homeland Security, so this situation made FEMA vulnerable to inter-agency rivalry for the funds appropriated by the presidency and Congress. Thus, we deduced that decentralization could be a better way to attain effective

disaster response, because decentralization could help local authorities improve their own disaster-management organizations and emergency plans peculiar to them. However, centralization at the state level, in other words at the national level, would be beneficial for lead disaster-management organizations to demand extra or complementary funds from the presidency.

In addition to the Hurricane Irene case as a point of comparison, we also noted critical problems in the responses of AFAD and NDMA. The Van Earthquake was the first real case for AFAD after its founding. Everything had seemed perfectly planned and coordinated before the incident, but the real-life scenario revealed that the preparations were only on the white papers and visual slides presented to governors. First, AFAD could not sustain an effective logistics and transportation network between affected and supporting locations. Second, it could not organize local organizations, and so most of the search and rescue efforts were indirectly assumed by military and international agencies. Finally, the response showed that plans were unrealistic and inapplicable for the Van region which is characterized by rough terrain with insufficient infrastructure. Surprisingly, the results of NDMA in the case of the floods of 2010 were quite similar.

The NDMA also experienced various logistical problems due to the unexpected magnitude of the floods that deluged all main transportation routes to the affected areas. This was the clue suggesting insufficient planning in preparedness. Like the AFAD, the NDMA also had similar organizational problems in terms of effectiveness, manpower, and coordination of efforts. As a result, these valuable findings suggested that if a country wanted to successfully deal with natural disasters, it had to establish an agency whose organizational structure was not a mockery or coarse copy of other developed agencies that had the ability to meet the requirements of their home countries.

Finally, we collected all our findings including the pros and cons of each agency in each particular case in order to articulate our relevant recommendations to the state authorities of the U.S., Turkey, and Pakistan. Our main concern was to show the readers that establishing an agency could not be the agenda of governments, because doing that would not warrant a successful organization; however, we intended to demonstrate that an agency had to have particular norms, values, and common sense in order to develop

into a successful and persevering organization that had the ability to deal with the problems, requirements, and changing state of the environment, life, and nature.

LIST OF REFERENCES

- Abro, Nadeem Ahmed. "Disaster Laws in Pakistan." October 12, 2012.
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CDQQFjAA&url=http%3A%2F%2Fwww.ifrc.org%2FPageFiles%2F90903%2FDisaster%2520Laws%2520in%2520Pakistan%2520-%2520Nadeem%2520Ahmed%2520Abro.ppt&ei=Zl-rUv_MNsXwoASs5oAQ&usg=AFQjCNHKmYzmPwIYUCxYxFoMSoyfhOdTg.
- Afet ve Acil Durum Yonetim Baskanligi. 2013a. *Strategic Plan of 2013–2017*. Ankara: AFAD. https://www.afad.gov.tr/UserFiles/File/STRATEJI/Afad%20Strtjk%20web_en%20son.pdf
- Afet ve Acil Durum Yonetim Baskanligi. 2013b. *Turkish Disaster Management Plan*. Ankara: AFAD.
https://www.afad.gov.tr/UserFiles/File/STRATEJI/TAMP_4913.pdf.
- Afet ve Acil Durum Yonetim Baskanligi. "Disaster Report-Van Earthquake." Accessed May 18, 2014. <https://www.afad.gov.tr/EN/IcerikListele1.aspx?ID=107>.
- Akdağ, S. Emre. "Mali Yapı ve Denetim Boyutlarıyla Afet Yönetimi" [Disaster Management within the Perspective of Fiscal Structure and Audit]. *Sayıştay Dergisi* 1, no. 20 (March 2002): 44–45.
- Aktürk, Ğ., and M. Albeni. "Doğal Afetlerin Ekonomik Performans Üzerine Etkisi: 1999 Yılında Türkiye’de Meydana Gelen Depremler ve Etkileri" [The Impact of Natural Disasters on Economic Performance: The Earthquakes and Their Impacts that Occurred in Turkey in 1999]. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakülte Dergisi* 7, no. 1 (2002): 1–18.
- Alexander, David. 2002. *Principles of Emergency Planning and Management*. New York: Oxford University Press.
- Ansell, Jake, and Frank Wharton. 1992. *Risk: Analysis, Assessment, Management*. New York: Wiley.
- Arama Kurtarma Dernegi. "About AKUT." Accessed April 10, 2014.
<http://www.akut.org.tr/en>.
- Baird, A., P. O’Keefe, K. N. Westgate, and B. Wisner. "Towards an Explanation and Reduction of Disaster Proneness." *Disaster Research Unit Occasional paper* no.11, University of Bradford (August 1975).

- Center for Strategic & International Studies. September 2011. *The 2010 Flooding Disaster in Pakistan an Opportunity for Governance Reform or Another Layer of Dysfunction*, by Stacey White. Washington, DC: CSIS. http://csis.org/files/publication/110930_White_2010FloodDisasterPakistan.pdf.
- Coetzee, Christo, and Dewald van Niekerk. "Tracking the Evolution of the Disaster Management Cycle: A General System Theory Approach." *Journal of Disaster Risk Studies* 4, no.1 (December 2012): 1–9. doi:10.4102/jamba.v4i1.54.
- Coppola, Damon P. 2006. *Introduction to International Disaster Management*. Boston: Butterworth Heinemann.
- Corbacioglu, Sitki, and Naim Kapucu. "Critical Evaluation of Turkish Disaster Management: Historical Perspectives and New Trends." *The Turkish Public Administration Annual* 29, no. 31 (2005): 53–72.
- Covello, Vincent T., and Jeryl Manpower. "Risk Analysis and Risk Management: A Historical Perspective." *Risk Analysis* 5, no. 2 (June 1985): 103–118.
- DARA. *Inter-Agency Real Time Evaluation of the Humanitarian Response to Pakistan's 2010 Flood Crisis*, by Ricardo Polastro, Aatika Nagra, Nicolai Steen and Farwa Zafar. March 2011. <http://daraint.org/wp-content/uploads/2011/03/Final-Report-RTE-Pakistan-2011.pdf>.
- Department of Homeland Security. January 2008a. *National Response Framework*. Washington, DC: DHS. <http://www.fema.gov/pdf/emergency/nrf/nrf-core.pdf>.
- Department of Homeland Security. January 2008b. *Introducing National Response Framework*. Washington, DC: DHS. http://www.fema.gov/pdf/emergency/nrf/about_nrf.pdf.
- Department of Homeland Security. 2011. *FY 2011 Budget in Brief*. Washington, DC: DHS. http://www.dhs.gov/xlibrary/assets/budget_bib_fy2011.pdf.
- Department of Homeland Security. "Organizational Chart." Accessed April 11, 2014a. <http://www.dhs.gov/xlibrary/assets/dhs-orgchart.pdf>.
- Department of Homeland Security. "FEMA Fact Sheet." Accessed April 14, 2014b. [http://www.nrt.org/production/NRT/RRT3.nsf/Resources/federalfactsheet-2/\\$File/09_USDHS_FEMA_Fact_Sheet.pdf](http://www.nrt.org/production/NRT/RRT3.nsf/Resources/federalfactsheet-2/$File/09_USDHS_FEMA_Fact_Sheet.pdf).
- Derby, Stephen L., and Ralph L. Keeney. "Risk Analysis: Understanding How Safe is Safe Enough?" *Risk Analysis* 1, no. 3 (January 1981): 217–224.
- Dovers, Stephen, and John Handmer. 2007. *The Handbook of Disaster and Emergency Policies and Institutions*. London: Earthscan.

- Egyptian State Information Service (ESIS). "Pharaonic Egypt: 12th Dynasty." Under Rulers of Egypt. Accessed April 23, 2014. <http://www.sis.gov.eg/rulers/html/en12p.htm>.
- Elsevier. "The Historical Context of Emergency Management." Accessed on March 2, 2014. http://v5.books.elsevier.com/bookscat/samples/9780750685146/02~Chapter_1.pdf.
- EM-DAT. "Summarized Table of Natural Disasters in Pakistan 1900 to 2014." Last modified September 2013. <http://www.emdat.be/result-country-profile>.
- Erdik, Mustafa, Yaver Kamer, Mine Demircioğlu, and Karin Şeşetyan. "23 October 2011 Van (Turkey) Earthquake." *Natural Hazards* 64, no. 1 (2012): 651–665.
- European Union Institute of Security Studies. November 2010. *Pakistan Army's Role in 2010 Flooding and the Catch 22 Situation in Islamabad*, by Muhammad Amjad. Brussels: ISS. http://www.iss.europa.eu/uploads/media/Humanitarian_action_in_Pakistan_01.pdf.
- Evans, Edward, and Richard Ashley. 2004. *Foresight Future Flooding: Scientific Summary. Future Risks and Their Drivers*. London: Office of Science and Technology.
- Federal Disaster Management Agency. 1997. *Multihazard Identification and Assessment*. Washington, DC: FEMA.
- Federal Disaster Management Agency. 2008. *National Incident Management System*. Washington, DC: FEMA. https://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf.
- Federal Disaster Management Agency. "Federal Emergency Management Agency Publication 1," November 2010. <http://www.fema.gov/pdf/about/pub1.pdf>.
- Federal Disaster Management Agency. "Irene Update 36: Seeing the Team in Action in Vermont." blog entry by Craig Fugate, August 31, 2011. <http://www.fema.gov/blog/date/201108>.
- Federal Disaster Management Agency. "Hurricane Irene: Overview of Federal Family's Preparations and Response." Last modified July 16, 2012. <http://www.fema.gov/news-release/2011/08/25/hurricane-irene-overview-federal-familys-preparations-and-response>.
- Federal Disaster Management Agency. "U.S. Department of Homeland Security/FEMA" Last updated November 20, 2013a. http://www.fema.gov/media-library-data/1385401809888-8a8c72ef660372960259bb5850c28c93/FEMA+Org+Chart+11-20-2013_508.pdf.

- Federal Disaster Management Agency. "Collection: Hurricane Irene." September 20, 2013b. <http://www.fema.gov/media-library/multimedia/collections/229>.
- Federal Disaster Management Agency. "About the Agency." Last modified April 2, 2014a. <http://www.fema.gov/about-agency>.
- Federal Disaster Management Agency. "State Organization and Role in Emergency Management." Last modified May 28, 2014b. <http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CC0QFjAB&url=http%3A%2F%2Ftraining.fema.gov%2FEMIWeb%2Fedu%2Fdocs%2Fhazdem%2FSession%252017--State%2520Role.doc&ei=DZQkU9HuB4-logSJvoDwAw&usg=AFQjCNE3NSEsdNQiOYyxvSOPtKNfYmc4NQ>.
- Federal Disaster Management Agency. "Local Role in Emergency Management." Accessed April 12, 2014. http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCUQFjAA&url=http%3A%2F%2Ftraining.fema.gov%2FEMIWeb%2Fedu%2Fdocs%2Fhazdem%2FSession%252018--Local%2520Government%2520Role.doc&ei=GqUkU5nQJMbroASlw4GYBQ&usg=AFQjCNElQUjnCOQXf9528LSxwthfuGEH_A.
- Federal Flood Commission. 2011. *Annual Flood Report 2010*. Islamabad: Ministry of Power and Water. <http://www.ffc.gov.pk/download/flood/archieve/Annual.report2010.pdf>.
- Fieser, Erza. 2011. "Hurricane Irene Barrels toward U.S. as Caribbean Islands Take Stock of Damage." *Christian Science Monitor*. August 25. <http://www.csmonitor.com/World/Americas/2011/0825/Hurricane-Irene-barrels-toward-US-as-Caribbean-islands-take-stock-of-damage>.
- Florida Department of Agriculture and Consumer Services. "Hurricane Impact to Agriculture Industry." Accessed May 27, 2014. <http://www.freshfromflorida.com/Divisions-Offices/Plant-Industry/Science/Hurricane-Impact-To-Ag.-Industry>.
- Ganapati, N. Emel. 2008. "Disaster Management Structure in Turkey: Away from a Reactive and Paternalistic Approach?" *In Disaster Management Handbook*, edited by Jack Pinkowski, 281–321. Boca Raton: CRC Press.
- Global Facility for Disaster Reduction and Recovery. 2009. *Disaster Risk Management Programs for Priority Countries*. Washington, DC: GFDRR. <http://gfdrr.org/ctrydrmnotes/Pakistan.pdf>.
- Goodwin-Gill, Guy S., and Jane McAdam. 1996. *The Refugee in International Law*. Oxford: Clarendon Press.

- Hacaloglu, Selcan. "Turkey Quake Death Toll Rises to 534." *Associated Press*. October 27, 2011.
- Holloway, A. "Disaster Risk Reduction in Southern Africa: Hot Rhetoric, Cold Reality." *African Security Review* 12, no.1 (July 2010): 29–38.
doi:10.1080/10246029.2003.9627568.
- The Institute for Catastrophic Loss Reduction. 2012. *Telling the Weather Story*. Toronto: Insurance Bureau of Canada.
http://www.ibr.ca/en/natural_disasters/documents/mcbean_report.pdf.
- Kadioglu, M. 2011. Afet Yönetimi Beklenilmeyeni Beklemek En Kötüsünü Yönetmek. [Disasters Management: Expecting the Unexpected, Managing the Worst]. Istanbul: *Marmara Belediyeler Birliği*, 21–46.
- Kaya, Mustafa, and Savaş Zafer Şahin. "Türk Kamu Yönetiminde Gönüllülük ve Afet Yönetimi" [Voluntarism and Disasters Management in Turkish Public Administration]. Master's thesis, Atılım Üniversitesi, 2013.
- Khan, H., and Abuturab Khan. 2008. "Natural Hazards and Disaster Management in Pakistan." *Munich Personal RePEc Archive*, item ID:11052. http://mpra.ub.uni-muenchen.de/11052/1/MPRA_paper_11052.pdf.
- McEntire, David A. "Emergency Management in the United States: Disasters Experienced, Lessons Learned, and Recommendations for the Future." In *Comparative Emergency Management: Understanding Disaster Policies, Organizations, and Initiatives from around the World*, edited by David A. McEntire. Chapter 2. Washington, DC: FEMA.
<https://training.fema.gov/emiweb/edu/CompEmMgmtBookProject.asp>.
- Mehdi, Z. A. R. É., and Behnaz Nazmazar. "Van, Turkey Earthquake of 23 October 2011, Mw 7.2: An Overview on Disaster Management." *Iranian Journal of Public Health* 42, no. 2 (2013): 134.
- Mendelsohn, Robert, William D. Nordhaus, and Daigee Shaw. "The Impact of Global Warming on Agriculture: A Ricardian Analysis." *The American Economic Review* 84, no. 4 (September 1994): 753–771.
- Monroe, Scott D. "Chelyabinsk: The Evolution of Disaster." *Post-Soviet Geography* 33, no. 8 (August 1992): 533–545.
- National Climatic Data Center. 2013. *Billion-Dollar U.S. Weather/Climate Disasters 1980–2013*. Asheville: National Oceanic and Atmospheric Administration.
<http://www.ncdc.noaa.gov/billions/events.pdf>.

- National Disaster Management Authority. March 2007a. *National Disaster Risk Management Framework Pakistan*. Islamabad: NDMA. <http://unportal.un.org.pk/sites/UNPakistan/OneUN/DRM%20Documents/NDRM%20Framework%20Pakistan.pdf>.
- National Disaster Management Authority. March 2007b. *National Disaster Risk Management Framework*. Islamabad: NDMA. <http://www.ndma.gov.pk/new/booksandpublications/booksandpublicationndma.php>.
- National Disaster Management Authority. April 2008. *Monsoon Contingency Plan*. Islamabad: NDMA. http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCYQFjAA&url=http%3A%2F%2Fwww.ndma.gov.pk%2FDocs%2FAnnualReport%2FMonsoon%2520Contingency%2520Plan%252008%2520Final.doc&ei=XJ2FU6zRCc_7oATq1ICQBg&usq=AFQjCNGAlrTIZKYKhPJlAx5LyGW1uwVT2w&bvm=bv.67720277,d.cGU.
- National Disaster Management Authority. 2010. *National Disaster Response Plan*. Islamabad: NDMA. <http://www.ndma.gov.pk/Documents/NDRP/NDRP.pdf>.
- National Disaster Management Authority. April 2011a. *Annual Report 2010*. Islamabad: NDMA. <http://www.ndma.gov.pk/Documents/Annual%20Report/NDMA%20Annual%20Report%202010.pdf>.
- National Disaster Management Authority. April 12, 2011b. *Pakistan 2010 Flood Relief – Learning from Experience, Observations and Opportunities*. Islamabad: NDMA. http://www.ndma.gov.pk/Documents/flood_2010/lesson_learned/Pakistan%202010%20Flood%20Relief-Learning%20from%20Experience.pdf.
- National Disaster Management Authority. April 2011c. *Annual Report 2010*. Islamabad: NDMA. <http://www.ndma.gov.pk/Documents/Annual%20Report/NDMA%20Annual%20Report%202011.pdf>.
- National Disaster Management Authority. April 12, 2011d. *Pakistan 2010 Flood Relief – Learning from Experience*, by Jennifer Mckey, Ahmed Rashid and Zeeshan Noel. Islamabad: NDMA. http://reliefweb.int/sites/reliefweb.int/files/resources/F_R_11.pdf.
- National Disaster Management Authority. May 6, 2013. *National Progress report on the implementation of the Hyogo Framework for Action 2011–2013*. Islamabad: NDMA. http://www.preventionweb.net/files/28894_pak_NationalHFAprogress_2011-13.pdf.
- National Disaster Management Authority. “About NDMA.” Accessed on March 26, 2014a. <http://www.ndma.gov.pk/new/aboutus/aboutus.php>.

- National Disaster Management Authority. "National Strategy for Disaster Management." Accessed on March 27, 2014b. <http://www.ndma.gov.pk/new/aboutus/SDM.php>.
- National Emergency Management Association (NEMA). "State Emergency Management Agency Budget." Accessed April 15, 2014. http://www.nemaweb.org/index.php?option=com_content&view=article&id=210&Itemid=382.
- National Hurricane Center. "Hurricane Charley Tropical Cyclone Report." Accessed May 27, 2014. http://www.nhc.noaa.gov/pdf/TCR-AL032004_Charley.pdf.
- National Hurricane Center. February 2012. *Hurricane Irene Tropical Cyclone Report*, by Lixion A. Avila and John Cangialosi. Washington, DC: NHC.
- National Oceanic and Atmospheric Administration. 2011a. *The Deadliest, Costliest, and Most Intense United States Tropical Cyclones from 1851 to 2010 (And Other Frequently Requested Hurricane Facts)*, by Eric S. Blake, Christopher W. Landsea, Ethan J. Gibney, National Hurricane Center. <http://www.nhc.noaa.gov/pdf/nws-nhc-6.pdf>.
- National Oceanic and Atmospheric Administration. 2011b. *Irene by Numbers*. Washington, DC: NOAA. http://www.noaa.gov/images/Hurricane%20Irene%20by%20the%20Numbers%20-%20Factoids_V4_083111.pdf.
- National Oceanic and Atmospheric Administration. 2011c. *Service Assessment: Hurricane Irene*. Washington, DC: NOAA. <http://www.nws.noaa.gov/om/assessments/pdfs/Irene2012.pdf>.
- National Oceanic and Atmospheric Administration. "Billion-Dollar Weather/Climate Disasters" Accessed on May 27, 2014. <http://www.ncdc.noaa.gov/billions/events>.
- Neal, D.M. "Reconsidering the phases of disaster." *International Journal of Mass Emergencies and Disasters* 15, no.2 (August 1997): 239–264.
- Niazi, Javed Iqbal Khan. "Comparative Analysis of Emergency Response Operations Haiti Earthquake in January 2010 and Pakistan's Flood in 2010." Master's thesis, Naval Postgraduate School, 2011. Retrieved from <http://calhoun.nps.edu/public/handle/10945/5516>.
- Provincial Secretariat of Van. June–July 2012. *Idarecinin Sesi: Van Depreminde 365 Gun [The Voice of Administrator: 365 Days in the Van Earthquake]*, by Usla Atay, Van: Provincial Government of Van. http://www.tid.web.tr/ortak_icerik/tid.web/152/9-%20Atay%20USLU.pdf.

- Republic of Turkey Prime Ministry Disaster & Emergency Management Presidency. "AFAD Homepage." Accessed April 23, 2014. <https://www.afad.gov.tr/EN/Index.aspx>.
- Sirkin, S.U.S.A.nnah, James C. Cobey, and Eric Stove. 1997. "Landmines." In *War and Public Health*, edited by Barry S. Levy and Victor W. Sidel, 112–117. New York: Oxford University Press.
- Spotts, Pete. 2011. "Hurricane Irene by the Numbers: State by State Damage Reports." *Christian Science Monitor*, August 30. <http://www.csmonitor.com/U.S.A./2011/0830/Hurricane-Irene-by-the-numbers-state-by-state-damage-reports>.
- Steffen, W., A. Sanderson, P. D. Tyson, J. Jager, P. A. Matson, B. Moore III, F. Oldfield, K. Richardson, H. J. Schellnhuber, B. I. Turner II, and RJ Wasson. 2001. *Global Change and the Earth System. A Planet under Pressure*. New York: Springer.
- Stiglitz, Joseph E. 2003. *Globalization and its Discontents*. New York: WW Norton & Company.
- Turan, Menaf. "Lessons Learnt From Van and Erciş Earthquakes 2011, Turkey: An Evaluation of Disaster Management." *International Journal of Business and Social Science* 3, no. 22 (November 2012): 42–52.
- Turkish Armed Forces. "2011 Yili TSK'nin Yangin ve Dogal Afetlerde Sagladigi Destek Faaliyetleri" [The Support Supplied by Turkish Armed Forces in 2011 for Fires and Natural Disasters]. Accessed May 19, 2014a. http://www.tsk.tr/11_haberler_olaylar/11_6_tsknin_yangin_ve_dogal_afetlerde_sagladigi_destek/tsknin_yangin_ve_dogal_afetlerde_sagladigi_destek_2011.htm.
- Turkish Armed Forces. "Conducted SAR Missions." Accessed May 9, 2014b. http://www.tsk.tr/ing/2_general_issues/2_6_natural_disasters_search_and_rescue_sar/issues/Conducted_SAR_Missions.htm.
- Turkish Red Crescent. 2010. *Strategic Plan of 2010–2015*. Ankara: Turk Kizilayi. http://www.kizilay.org.tr/Upload/Editor/files/1310989917_web_Turkish_Red_Crescent_Society_Strategic_Plan_2010_2015.pdf.
- Turkish Red Crescent. "Turk Kizilayi Official Webpage." Accessed April 23, 2014. <http://translate.google.com/translate?hl=en&sl=tr&u=http://www.kizilay.org.tr/&prev=/search%3Fq%3Dkizilayin%20Bingilizce%20Bsayfasi%26client%3Dsafari%26rls%3Den>.
- Turkish Statistical Institute. "Population of Province/District Centers and Towns/Villages by Province and Sex, Population Density by Province 12.31.2011." Accessed May 18, 2014. <http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=10736>.

- Turkiye Radyo Amatorleri Cemiyeti. "TRAC Hakkında" [About TRAC]. Accessed April 10, 2014. <http://www.trac.org.tr/15-trac-hakkinda.html>.
- United Nations. 2007. *Intergovernmental Panel on Climate Change, Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation Summary for Policy Makers*. Geneva: United Nations. <http://www.ipcc-wg2.gov/AR4/website/intro.pdf>.
- United Nations Department of Humanitarian Affairs. 1992. *Internationally Agreed Glossary of Basic Terms Related to Disaster Management (DNA/93/36)*. Geneva: United Nations.
- United Nations Disaster Relief Organization. "UNDRO: Coping with Disasters...A Fine Line." *United Nations Chronicle*, 28, no. 2 (June 1991).
- United Nations Office for the Coordination of Humanitarian Affairs. 2010. *Pakistan: Top 10 Natural Disasters since 1935*. Lahore: UNOCHA. <http://www.irinnews.org/report/90115/pakistan-top-10-natural-disasters-since-1935>.
- Unlu, Ali, Naim Kapucu, and Bahadır Sahin. "Disaster and Crisis Management in Turkey: A Need for a Unified Crisis Management System." *Disaster Prevention and Management* 19, no. 2 (2010): 155–174.
- Van der Ploeg, Frederick, and Cees Withagen. "Is There Really a Green Paradox?" *Journal of Environmental Economics and Management* 64, no. 3 (November 2012): 342–363.
- Vanneuville, Wouter, Wim Kellens, Philippe De Maeyer, Genserik Reniers, and Frank Witlox. "Is 'Flood Risk Management' Identical to 'Flood Disaster Management'?" *Earthzine*, (March 21, 2011). <http://www.earthzine.org/2011/03/21/is-flood-risk-management-identical-to-flood-disaster-management/>.
- The Virtual Museum of the City of San Francisco. "Timeline of the San Francisco Earthquake April 18–23, 1906." Accessed May 27, 2014. <http://www.sfmuseum.org/hist10/06timeline.html>.
- World Conference on Disaster Relief. 2005. *A Review of Disaster Management Policies and Systems in Pakistan*. Islamabad: WCDR. <http://saarc-sdmc.nic.in/pdf/pakistan/file3.pdf>.
- World Bank. 1999. *Marmara Earthquake Assessment Report*. Ankara: Devlet Planlama Teskilati. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2004/02/02/000160016_20040202133204/Rendered/PDF/273800Marmara010Assessment01public1.pdf.

Yılmaz, Sinan, and İbrahim Işıtan. “Doğal Afetlerin Psiko-Sosyal Sonuçları: Van Depremi Örneği” [The Psychosocial Consequences of Natural Disasters: The Van Earthquake Example]. *Toplum Bilimleri Dergisi* 6, no. 11 (2012): 7–30.

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