

# **CURRENT STATE OF PRACTICE IN DISASTER RISK MANAGEMENT**

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The Kingdom of Saudi Arabia has historic profile of multifaceted disasters, including, floods, earthquakes, volcanoes, cyclones, sand storms, rock falls, collapse of structures, epidemics, fire, terrorist acts, stampedes and other complex emergencies. The recurring enormous human and material losses emphasize the need for pursuing modern concept and approach which entail paradigm shift in handling disasters, from 'response centric' to 'proactive' disaster risk management (DRM) leading to disaster-resilient infrastructure, building integrated response capability and achieving enhanced awareness in the societal context. The DRM encompasses all activities related to disaster mitigation, preparedness, emergency response, recovery, rehabilitation and reconstruction. The study synthesizes information obtained on DRM from published literature, personal experiences and interaction with the stakeholders. Besides, questionnaire survey was also conducted to assess the community awareness and preparedness of concerned departments. The study undertakes comprehensive review of KSA disaster profile, current practices, response capability and human resource development. It has been identified that KSA is confronting multifaceted challenges including, lack of formal training and professional expertise; lack of understanding about conceptual aspects of disasters and coordination amongst various stakeholders; and absence of hazard risk assessment, mapping or micro-zoning, building codes, etc. This paper gives KSA state of practices, institutional mechanism and capacity building needs to manage disasters on integrated and sustainable basis.

*Keywords:* Integrated, Sustainable, Infrastructure, Community, Awareness, Stakeholders.

## **1 INTRODUCTION**

Over the past few decades, the devastating impacts of disasters have aggravated manifold, adversely affecting almost all countries across the globe. The increase in population, changed land use patterns, unplanned development and climate change were mostly the underlying causes of many catastrophic events. To minimize losses, the concept of disaster risk management (DRM) is evolved to evaluate and mitigate the damages through proactive risk management. The Kingdom of Saudi Arabia (KSA) also suffered enormous losses due to recurring multifaceted disasters. The disaster profile of KSA indicates that its north western region is prone to earthquakes and volcanic hazards, the central and western region to floods, the south west mountainous region to landslides and the central and eastern regions to dust storms (Al-Bassam *et al.* 2014). This paper, based on synthesis study and questionnaire survey, gives state of the

practice, institutional mechanism and capacity building needs to manage disasters in KSA on integrated and sustainable basis.

## 2 DISASTER RISK MANAGEMENT - CONCEPTUAL ASPECTS

DRM is defined by UN International Strategy for Disaster Reduction (UNISDR 2009) as "The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster". The DRM mainly encompass three phases; prior, during and post disaster. The pre-disaster phase comprises four steps: a) risk identification and assessment; b) risk prevention, mitigation and reduction; c) risk transfer; and d) preparedness. The during-disaster phase encompass emergency response, to include rescue, relief and recovery. Whereas, post-disaster phase comprises rehabilitation and reconstruction. The primary objectives of DRM include: develop resilience in society against disasters; minimize damages through sustainable development; reduce disaster risks and vulnerabilities; and develop institutional framework, defining roles and responsibilities of all the stakeholders.

## 3 DRM PRACTICES IN KSA

The history of emergency management in KSA can be traced back to late 1920s when the first emergency management body, i.e., fire brigade, was raised in Makkah, primarily aimed at serving pilgrims. In 1948, the fire brigade was merged into a new department, General Security and Fire Services, which was replaced in 1965 by General Directorate of Civil Defense (GDCD). However, the structure, goals and responsibilities of GDCD were later reformed and it is now the main organization responsible for DRM (Alamri 2010).

The current framework of the GDCD is organized into three levels: Board of GDCD, Executive Committee, and volunteers. The board consists of Minister of Interior as Chairman, Assistant Minister of Interior as Deputy-Chairman and a number of members from various divisions of GDCD such as fire services, police, emergency medical services, etc. The Executive Committee manages the daily affairs and operational matters. Whereas, volunteers are citizens willing to assist GDCD during any calamity. GDCD is also assisted by a number of related departments and services, like Hajj and Umrah Special Forces, Makkah's Disaster Management Center, Red Crescent, Traffic, General Police and Highway Forces, etc.

Table 1. Disasters causing human losses in KSA.

Disaster Type	Date	No. of Affected	No. of Killed	Reference
Fire during Hajj	Apr, 1997	> 1,500	343	(Pararas-
Rift Valley Fever	Sep, 2000	500	87	Carayannis
Earthquake in Harrat Lunayyir	May, 2009	40,000	-	2013)
Jeddah Floods	Nov, 2009	>10,000	161	(Alamri 2010)
Crane Collapse in Makkah	Sep, 2015	394	111	(Batrawy 2015)

### **3.1 Significant Disasters in KSA**

KSA has experienced numerous devastating events, suffering enormous human and material losses. Table 1 gives inventory of significant disastrous events, whereas salient aspects of various disasters are briefly summarized in succeeding sub paragraphs.

#### **3.1.1 Flood**

Floods remained the most frequent hazard in KSA during 1982-2005, with an average return period of 7 times per years along with average economic losses of USD 19 million (Al-Saud 2010). Also, floods account for 7th of the 10 most damaging disasters during 1900-2010. In 2009, Jeddah experienced the worst floods, resulting in 161 deaths and monetary losses of US\$ 900 Million (Alamri 2010).

#### **3.1.2 Earthquake**

KSA is relatively less vulnerable to earthquakes since it is not located along the collision boundaries of the Arabian Plate (Pararas-Carayannis 2013). However, its north western region experienced numerous shocks during April-June 2009, with maximum recorded earthquake of magnitude 5.4 (Pallister *et al.* 2010).

#### **3.1.3 Tsunami**

The Arabian Peninsula has been affected by tsunamis in the past, with most of the recorded tsunamis occurring along its eastern and southern edge. The Tsunami formed by the 1883 Karakatau volcano eruption, the 1945 Makran earthquake or the 2004 Sumatra event, were extremely destructive. Two, localized tsunamis have been recorded in the Red Sea and another in the Persian Gulf (Pararas-Carayannis 2013).

#### **3.1.4 Fire**

The worst fire incident occurred during Hajj in 1997 that claimed 343 lives and wounded more than 1,500 pilgrims (Alamri 2010). Fire remains potentially the most often occurring hazard that has caused enormous losses.

#### **3.1.5 Volcanoes**

Historically, the area has witnessed volcanic eruption, with last recorded around 1400 years ago (Grainger 2007). In 2009, the lava field of ‘Harrat Lunayyir’ experienced numerous shocks, highlighting its potential vulnerability (Pararas-Carayannis 2013).

#### **3.1.6 Collapse of structures**

In September 2015, a crawler crane toppled over the Grand Mosque in Mecca that killed 111 people and injured 394 (Batrawy 2015). Earlier, in 2006, a hostel near the Holy Mosque in Mecca collapsed after a fire had spread in lower floors of the building that killed 76 people and injured 64 (Alamri 2010). The old infrastructure and services in the ancient cities remain potentially vulnerable.

### 3.1.7 Epidemics

The worst epidemic disaster that has occurred was 2000 Rift Valley Fever outbreak which killed at least 87 people and affected more than 500 people (Alamri 2010). The two holy cities are visited by millions from across the world and, despite all preventive measures, epidemics remain potential source of disaster.

## 4 QUESTIONNAIRE SURVEY

Two survey questionnaires were developed to determine the state of community awareness and the preparedness of DRM organizations. The community awareness questionnaire mainly covered five areas and it was responded by 147 persons. Whereas, questionnaire pertaining to DRM organizations had 19 questions, which was responded by 14 stakeholders. The results and analysis of the survey is presented below.

### 4.1 Community Awareness Survey

The results of community awareness survey are given in Table 2.

Table 2. Results of community awareness survey.

DRM Aspects	Summary of Question	Percent
Disaster related knowledge	Knows about Disasters	5
	Disasters cannot be totally prevented	83
	Have basic education of DRM	84
	Attended training on DRM	20
	Listened to experts on DRM	27
Disaster preparedness and readiness	Preparation for disasters is important	90
	Importance of disseminating knowledge about disaster	92
	Government and its organizations can manage disasters	75
	Government will provide relief facilities	89
	Government will undertake reconstruction after disaster	88
Disaster Adaptation	Lacks awareness about evacuation areas	77
	Has no knowledge about organization to be contacted	50
	Knowledge about disaster prone areas	70
	Lacks awareness about community participation.	47
Disaster Awareness	Never participated in voluntary activities	84
	Lacks awareness about the retrofitting of building	73
	Lacks knowledge about emergency aid	76
	Giving priority to disaster awareness at local, regional and national level	74
	Early recovery after disaster is crucial.	83
Disaster risk perception	Large-scale disasters could occur	39
	Locality is not safe against disasters	79
	Buildings are not well designed to withstand disasters.	71

### 4.2 DRM Stakeholder Organizations Survey

The results of DRM stakeholder organizations survey are briefly summarized in the following sections.

#### **4.2.1 *Probability of occurrence and damage potential of disasters***

Disasters are most likely or likely to occur in the following order: fire, collapse of structures, terrorist acts, epidemics, cyclones, landslides / rockfalls, sand storms, floods and industrial accidents. Whereas the damage potential of disasters is reported in the following order: floods, fire, epidemics, cyclone, collapse of structure, terrorist acts, earthquake, tsunamis, rockfalls, industrial accidents and sand storms. It has also been reported that existing infrastructure lacks resilience against disasters.

#### **4.2.2 *State of preparedness to manage disasters***

Organizations are either not prepared or the state of preparedness is below satisfactory against almost all disasters. Also, they are not properly equipped or state of equipment held is below satisfactory. It has also been reported that either no warning arrangements exist or the state of multi-hazard early warning systems is below satisfactory.

#### **4.2.3 *State of training & community awareness***

Organizations are not well trained to efficiently manage disasters. The state of community awareness and training is also reported as below satisfactory.

#### **4.2.4 *Need for DRM plans & implementation***

The planning to respond to disaster is reported unsatisfactory and serious problems have been reported in DRM implementation. DRM organizations strongly endorsed the need for the following: hazard mapping and urban planning, education and awareness, shelter and foods, medical kits, transportation of victims, community participation and early warning mechanism.

### **5 FINDINGS OF THE STUDY**

Saudi Arabia is vulnerable to multifaceted natural and manmade disasters, whereas floods, sand storms, fires, collapse of structure and epidemics are considered recurring and most hazardous. The community is generally aware of the nature and consequences of these disasters, but lacks formal education, training and exposure to any kind of community awareness or participation programs. The DRM organizations are also deficient of requisite training, professional expertise and modern equipment to manage various disasters efficiently. The DRM organizations generally pursue response oriented event specific approach, whereas modern concepts emphasize proactive integrated DRM. Besides, KSA lacks framework for coordinated response, hazard risk assessment, mapping or micro-zoning, building / services guidelines, specifications, codes and regulatory mechanism, which are essential for sustainable development.

### **6 WAY FORWARD**

The study concluded that a paradigm shift in concept and approach to handle disasters in KSA is essentially required. The enormous challenges relating to community

awareness, education, training and capacity building have to be addressed on urgent basis. Following is recommended in this respect:

- Need to formulate DRM institutional framework outlining roles and responsibilities of various stakeholders, along with addressing training and capacity building needs, with focus on innovation, technology and integration.
- Need DRM strategy, plans and manuals, containing specifications, standards and guidelines for developing well planned, technically sound, environmentally compatible and socially acceptable sustainable urban infrastructure.
- Need to establish an institution for DRM education, training and awareness programs, besides introducing academic and research activities, like degree program, short certification courses, seminars and workshops.
- KSA being signatory of the UNISDR's Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disaster, entailing paradigm shift from reactive to proactive approach, is re-emphasized for compliance. A national level effective body needs to be established to develop framework, ensure phased implementation and enforce monitoring mechanism.

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