Review Paper

A REVIEW OF FLOOD DISASTER AND DISASTER MANAGEMENT IN MALAYSIA

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Abstract

Flooding is the most frequent severe weather threat and the costliest natural disaster facing the nation. Flood is one of the many types of natural disaster that affects human lives and environment. The serious flood happened in 2014 gives a huge negative impact on the economy and to society in general on several states especially in Kelantan, Malaysia. These floods are extensive, severe and unpredictable and result in significant loss of life, damage to crops, livestock, property, and public infrastructure (Winstedt, 1927). This paper reviews the flood disaster in detail. Some types of disaster are discussed along the impact of the disaster. The paper discusses the disaster management that applied in other nation and in Malaysia.

Key Terms: Natural disaster, flood, disaster management, preparation, Small Medium Enterprises, recovery

1. Introduction

Mother nature is an inevitable event. Tsunami disaster which happened in 2004 has left significant impact towards human race and civilisation. To the world, it is not a new phenomenon. It is something which has happened for ages (i.e. Krakatoa eruption, Highland Tower Landslides). Rapid changing of world geo-climate has caused the disaster to happen frequently nowadays. Thus it is believed that natural disasters could be the reason contributing to high level of stress and other psychological problems (i.e. trauma) facing by affected victims.
On top of that, post traumatic impact might leave the living survivors to live their life in a state of fear of past and uncertain future (Hull et. al, 2002; Morgan et. al, 2003; Galea et. al, 2005). Natural disaster does not only leave their marks on victims’ psychological state, it also gives impacts towards physical destruction such as loss of properties and live stocks.

Previous studies carried out by United Nation (2006), statistical data showed that 75% of the world’s population lives in areas that have been affected at least once by earthquakes, tropical cyclones, floods or droughts between 1980 and 2000. Furthermore, United Nation further discovered that billions of people in more than 100 countries are periodically exposed to at least one of these events. In the last two decades, more than 1.5 million people have been killed by natural disasters. Globalization and the growing interconnectedness of global society mean that catastrophic events in one place have the potential to affect lives and public policies in distant locations (United Nations Development Programme, 2004).

Additionally, the rising awareness on natural disasters leads to the urgent need for natural disaster risk reduction where all states around the world has made a resolution at the World Conference on Disaster Reduction in 2005 (United Nations Development Programme, 2004). The resolution expects to achieve the outcome of a substantial reduction in disaster losses, in lives and in the social, economic and environmental assets of communities and countries in the next ten years (United Nations, 2006). Therefore, the disaster management is important action that should be implemented in order to solve that particular issue.

2. Definition of Disaster

Moe et al. (2007, pp 787) defined a disaster as a situation which overwhelms local capacity, necessitating a request to the national or international level for external assistance, or is recognized by a multilateral agency or by at least two sources, such as national, regional or international assistance groups and the media. According to the Emergency Disasters Database (2006), disasters are classified as natural disasters or technological disasters. To be recorded as a disaster, an event must fulfill at least one of the following conditions: ten or more people reported killed, 100 people or more reported affected, a declaration of a state of emergency or a call for international assistance.

The National Security Council Malaysia (NSC) defines a disaster under NSC D20 (National Security Council Malaysia, 1997) as "an incident that occurs in a sudden manner, complex in nature, resulting in the loss of lives, damages to property or the environment as well as affecting the daily activities of local community. Such incident requires the handling of resources, equipment, frequency and extensive manpower from various agencies as well as effective coordination and the possibility of demanding complex actions over a long period of time".

Meanwhile, United Nations (2006) classified natural disasters into hydro-meteorological disasters, including floods and wave surges, storms, droughts and related disasters such as extreme temperatures and forest/scrub fires; geophysical disasters, including earthquakes and tsunamis and volcanic eruptions; and biological disasters covering epidemics and insect infestations. Among natural disasters, floods, windstorms, droughts and geophysical disasters have shown the fastest rate of increase over past years.

3. Types of Disaster

Previous studies by Ibrahim Mohamed Shaluf, (2007) mentioned that there are many research centres and agencies all over the world that are concerned with disaster management (prevention, preparedness, mitigation, response and relief). Research centres and agencies sometimes describe disasters in different terms, although disasters have been classified as natural, unnatural man-made, purely social, technological, and hybrid. However, it has been found that disasters can be classified into three types: (i) natural;
(ii) man-made; and  
(iii) hybrid

Natural disasters are catastrophic events resulting from natural causes such as volcanic eruptions, tornadoes, earthquakes, etc., over which man has no control. Ibrahim Mohamed Shaluf (2006) emphasized that natural disasters are often termed “Acts of God”. The authors believe that everything happen with the will of the god.

Man-made disasters, on the other hand, are those catastrophic events that result from human decisions. The International Federation of Red Cross and Red Crescent Societies (2003) highlighted that a man-made disaster refers to non-natural disastrous occurrences that can be sudden or more long-term. Sudden man-made disasters include structural, building and mine collapses when this occurs independently without any outside force. Air, land, and sea disasters are examples of man-made disasters and long-term man-made disasters tend to refer to national and international conflicts.

Ibrahim Mohamed Shaluf, (2007) in his studies discussed that there are two types of disasters known as hybrid disasters. A hybrid disaster is a deathly combination of both human error and natural forces. An example of a hybrid disaster is the extensive clearing of jungles causing soil erosion, and subsequently heavy rain causing landslides. Natural, man-made and hybrid disasters, and disastrous events are summarized in Table I (page 3 until 5).

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<tr>
<th>Disaster type</th>
<th>Sub-disaster</th>
<th>Name of disaster</th>
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| Natural       | Natural phenomena beneath the Earth’s surface | Earthquakes  
Volcanic eruptions |
|               | Topographical phenomena | Tsunamis  
Landslides  
Avalanches |
|               | Meteorological/hydrological phenomena | Windstorms (cyclones, typhoons, hurricanes)  
Tornadoes  
Hailstorms and snowstorms  
Sea surges  
Floods  
Droughts |
|               | Biological phenomena | Heat waves/cold waves  
Infestations (locust swarms, mealy bug)  
Epidemics (cholera, dengue, ebola, malaria, measles, meningitis, yellow fever, HIV/AIDS, tuberculosis) |
| Man-made      | Socio-technical Technological disasters | Fire  
Explosions (munitions explosions, chemical explosions, nuclear explosions, mine explosions)  
Leakage  
Toxic release  
Pollutions (pollution, acid rain, chemical |
4. **Flood Disaster**

Floods are known as frequent and most devastating events worldwide. WWAP (2006) stated that China, India, Philippines, Iran, Bangladesh and Nepal are extremely vulnerable and more affected by the floods. It shows that the majority of affected flood disasters are poor people from developing countries, who suffer the most and are the first causalities reported of such disasters. The devastating consequences from the occurrence of flood in developing countries are worse through self-exited poverty-cycle phenomenon (Osti, 2004).

Hence, this worrying trend of destruction due to flood in developing countries will further continue unless the reliable coping mechanism are well established in advance. Nonetheless, due to the lack of awareness, resources and appropriate approach, the issue could not be solved...
as what developed countries have done. This particular vulnerability of developing countries underlines the urgent need to promote relatively fast, technically tolerable, environmentally friendly and socially accepted cost-effective structural as well as non-structural countermeasures that should be planned and implemented by community according to their real needs and affordability.

Multilingual Technical Dictionary on Irrigation and Drainage, (ICID) define flood as a relatively high flow or stage in a river, markedly higher than the usual. Additionally, flood, as defined by the International Commission on Irrigation and Drainage, is a relatively high flow or stage in a river, markedly higher than the usual; it also includes the inundation of low land which may result therefrom. A river will be floods when it can no longer contain the discharge from its catchment and the bank full stage is exceeded (Sharma & Priya, 2001). Furthermore, depending on the geographical setting, floods can be classified as: river floods, rainfall floods, flash floods, tidal floods, storm surge floods and urban floods (Chowdhury et al., 1997). Floods can be also broadly classified into “normal” and “abnormal” or “extreme” events.

Other than that, Houston (2011) further argued that flooding is a broad term which refers to an area that is submerged under water. For some areas, floods can be a natural part of the hydrological cycle while for others, typically urban areas, floods are unwanted and can cause severe problems.

The causes of a flood may vary according to the geographical condition as well as the location (i.e. lower ground). Houston, (2011) discussed that in fluvial flooding water level rises in rivers due to volume rich rain events in the sub-catchments upstream and the water level overtop the riverbanks and starting to spread on land. In coastal flooding sea level rises in over land, often due to a combination of storm surges, wave action and tide cycles. Pluvial flooding is associated with heavy rain events and occurs when precipitation flows on the surface and ends up in temporary ponds in depressions, due to insufficient conveyance capacity compared to rainfall intensity.

5. The Impact of Flood Disaster

Previous study by Pitt, (2008) discovered that flooding is one of the main extreme weather that has influenced United Kingdom in the recent years including flood in 2004, 2005, and 2007. The Pitt Review (Pitt, 2008) and Environment Agency (Chatterton et al., 2010) estimated that flooding of 2007 affected 48,000 homes and about 7,000 businesses in the UK and caused damage to the value of approximately £3 billion. National Risk Register for the UK (Cabinet Office, 2010) identifies coastal and inland flooding as risks that have a quite high likelihood and impact.

Furthermore, Environment Agency estimates the expected annual damages to residential and non-residential properties in England at risk of flooding currently to be more than £1 billion (Environment Agency, 2009a). Recent flood events in the UK have caused significant disruptions to the business industry, especially Small and Medium Enterprise (SMEs), which are often affected disproportionately hard by such events and are less prepared to manage the consequences (Crichton, 2006; BMG Research, 2011). Adaptation to the risk of flooding has thus become an issue of significant importance to SMEs, in inhibiting any potential disasters and interruptions to communities, if they are at risk of being flooded.

Apart from that, flooding can have a critical impact on a business direct or indirectly. Damaged or lost stock, destruction on building/ premises, damaged or lost building equipment, inability to conduct business, and inconvenience to staff were the main short-term impacts experienced by small businesses in Yorkshire affected by 2007 summer floods (EKOS Consulting (UK) Ltd, 2008). Long-term impacts of flood disasters included disrupted cash flow and lost income, staff anxiety from flooding to business, and higher insurance premiums.
In a survey by BMG research (2011) on businesses affected by 2009 Cumbria floods, the costs that have been acquired as a result of damage or loss caused by the storms and flooding, during the event (November 2009) up to August 2010, the mean costs incurred per business were found to be about £35,000, as per the estimates by a sample of 324 businesses. Whereas there may be significant variations in costs incurred by larger businesses and SMEs, the figure suggests how costly flooding can be to a business.

Although direct impacts are often highlighted, indirect impacts of flooding may also create negative consequences on businesses. Woodman (2008) identified that 535 of employee are unavailable for work, flooded premises (offices, shops, etc.) - 38 per cent, and suppliers disrupted - 27 per cent as the main impacts of flooding experienced by a sample of 255 businesses affected by 2007 flooding, suggesting that the impacts of flooding extend well beyond the direct impacts.

Moreover, Philippines is known as one of the most disaster-prone countries in the world. Between January 1900 and May 2006, the EMDAT database of the Centre for Research on Epidemiology of Disasters (CRED) listed 379 disasters that each killed at least more than ten people, hindered the life of more than 100 individuals, or required international aid (Centre for Research on Epidemiology of Disasters, 2006).

These incidents caused economic damages worth US$7 billion and killed more than 48,000 people. Millions of other Filipinos were directly or indirectly affected. Flooding and flood-triggering typhoons top the list of natural phenomena identified with disasters in the archipelago with 60 and 210 events, respectively.

6. Flood Disaster in Malaysia

Flood is the most devastating natural disaster experienced in some countries, especially in Malaysia. Ninety-seven percent (97%) of the water on earth is salt water and only 0.014% is found in lakes, rivers, underground and in the air. Floods in Malaysia have been classified in two categories by the Malaysian Drainage and Irrigation Department which are flash flood and monsoon floods (DID, 2000a). Based on the hydrological perspectives, there are clear difference between these two disasters is the period taken by the river flow to recede to the normal level. In terms of duration to recover, flash floods take only some hours to return to the normal water level; meanwhile monsoon flood can take last for a month to recover (Noorazuan, 2006).

The Department of Irrigation and Drainage (DID) highlighted that throughout Malaysia, including Sabah and Sarawak, there is a total of 189 river basins with the main channels flowing directly to the South China Sea and 85 of them are prone to recurrent flooding (89 of the river basins are in Peninsula Malaysia, 78 in Sabah and 22 in Sarawak). The estimated area vulnerable to flood disaster is approximately 29,800 km2 or 9% of the total Malaysia area, and is affecting almost 4.82 million people which is around 22% of the total population of the country (DID, 2009).

The extreme flooding happened in 2014, gives a huge negative impact on the economy and to society in general on several states especially in Kelantan. These floods are extensive, severe and unpredictable and result in significant loss of life, damage to crops, livestock, property, and public infrastructure (Winstedt, 1927). The General Director of the Drainage and Irrigation Department, Hj Ahmad Hussaini (2015) states that there are two major water-related problems affecting this country; excess water (floods) and water shortage (droughts).

Both these problems have disrupted the quality of life and economic growth in the country and can result in severe damage and loss of property, and occasionally loss of human lives, as can be seen in the December 2006 and January 2007 floods in Johor (Hussaini, 2007). Hence, the damage caused by the recent flooding in parts of north and estern Malaysia in 2014 is likely to exceed RM1 billion or almost USD$300 million (Berita Harian, 2014). Based on the statements by Kelantan’s Flood Disaster Operations Committee chairman Datuk Seri Mustapa Mohamed in 2014, the flood damage in Kelantan alone almost reached RM200 million.
7. Disaster Management

Disaster management activities has its own characteristics – e.g., related to the time scales, time pressure, activities and actors involved – and the stakeholders involved in different activities have their own system requirements, it is still possible to identify at least one common challenge that constrains the ability of risk and emergency management to plan for and manage emergencies effectively and efficiently: the need for better information (Cutter et al. 2003; Parker et al. 2007; Zlatanova et al. 2007; Fiedrich, and Zlatanova, 2013; Kaviani et al., 2014).

A study conducted by Mileti and Paul (1992) on the disaster preparedness in Hawaii, concluded that more frequent inter-agency drills should be done to improve the disaster preparedness. The authorities should also increase funding for family emergency preparedness and local community response teams. The emergency response coordinators should conduct continuous training to make sure that they are more prepared. Metri (2006) proposed Quality Circle (QC) framework in India to enable the disaster that occurred can be tackled speedily. Owing to the direct involvement of public, the proposed framework strengthens the knowledge and awareness on disaster management which in turn helps towards disaster preparedness and disaster mitigation effectively.

In Malaysia, Billa, et al., (2006) have proposed a spatial decision support system (SDSS) technology in flood disaster management that incorporate capabilities in the areas of dialog between system component, data acquisition, storage and retrieval and data modelling and manipulation. These capabilities broadly involve the sharing of interactive mapping tools, evaluation of results by multi-criteria evaluation techniques, visualization and display of results. A well design SDSS for flood disaster management should thus present a balance among these three capabilities.

The efficiency and usefulness of flood forecast and warning are enhanced through the interaction of the various stages and components of the system with the affected population. Most importantly is how the forecasts influence timely decision making and are used effectively by the protagonist in the flood management and mitigation process. Flood disaster management comprises of detection, forecasting and warning component for which various decision making criteria will be promoted by the interest groups (Billa et al., 2006).

8. Conclusion

Every year, floods cause immense damage in developing countries and huge proportion of such destruction is associated with lack of knowledge, resources and coping mechanisms. Therefore, it is essential to develop a program that should start with a campaign aiming to build community to understand their vulnerabilities, strategies, activities and the role they could play in managing flood risks without relying on external entities.

After more than half a century of flood management, Malaysia is still subject to severe floods. Indeed, Malaysia will never be flood-free. Floods and other disasters will continue to impact upon the people and bring negative effects on life, properties and infrastructure. This is unavoidable. Even though the area of disaster management has received considerable attention due to its impact to one’s country, Malaysia is not prepared for it. The most recent experienced in early 2015 has open the eyes of many parties especially among NGOs and government agencies to find the best remedies to ensure better preparation yet, before it strikes again.

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