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Brief Review

An Overview of Environmental Disaster in Malaysia and Preparedness Strategies

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Abstract

Malaysia is affected by moderate environmental disasters but seldom affected by severe disaster. Cameron Highland mud floods 2013, Hulu Langat landslide 2011, tsunami 2004 and Highland Tower 1993 are some of environmental disaster in Malaysia. Some of these disasters carry heavy price tags as property and lives are damaged beyond full compensation and repair and health effects as well. This paper was focused on environmental disaster in Malaysia with reference to flood and landslide. The scope of this paper is to provide input for a clearer understanding of these disasters and how public could be safe from these hazards with preparedness strategies. This paper involved with secondary data collected from journal, proceedings, books, related agencies and internet sources as well. Normally, humankind is capable of saving their self and Earth as well, if they recover the principles of solidarity, complementarity and harmony with nature in contraposition to the reign of competition, profits and rampant consumption of natural resources. They also must strongly support a sustainable development and a sustainable land use concept in order to sustain the environment from degrades. In addition, community-based disaster preparedness is essential in preventing and responding to the full array of environmental disasters in keeping human losses as low as possible. Ways must be found to ensure that a community is strengthened, becoming less fragile and less susceptible to environmental disaster impact. In addition, community needs to be assist in order to survive despite receiving the impact of severe disasters.

Keywords: Environmental disaster, Malaysia, Human activity

Introduction

No country is immune from environmental disaster. Environmental disasters are a disaster to the natural environment mostly due to human activity such as over-exploitation of natural resources and unsustainable development that result in disease and death of living beings. Environmental disasters can result from technical accidents, human, technological or mechanical failure or carelessness; they can be the consequence of long-term environmental pollution, such as, the greenhouse effect or the destruction of the ozone layer (1). However, human intervention in the environment is the main factors that created the disaster. Thus, the interaction between the environment, social structure and individual action leads to chronic environmental changes such as drought, soil erosion and deforestation. The intensity of environmental disasters is weighed in

terms of the quantum of damages done to the human society. Divided losses caused (consequence) by disaster into can be divided into two, direct and indirect (2). Direct losses included losses due to injury or dead and the cost of restoring the damaged while indirect losses included time losses, travel cost and office operating losses. From the health perspectives, environmental disaster increase risk for diseases, infection and other injuries as well. Environmental disasters can contribute to the transmission of some diseases, especially since water supplies and sewage systems may be disrupted; sanitation and hygiene may be compromised by population displacement and overcrowding; and normal public health services may be interrupted.

Malaysia normally affected by moderate environmental disasters but seldom affected by severe disaster. In Malaysia, environmental disaster frequency and severity have increased. Tsunami, flood and landslide are some examples of environmental disasters which hit this country. However, the unpredictability and ferocity disaster such as tsunami make protection and preparedness very difficult. Thus, in January 2005, 168 Governments adopted a 10-year global plan for natural disaster risk reduction called the Hyogo Framework. It offers guiding principles, priorities for action and practical means for achieving disaster resilience for vulnerable communities.

This paper was focused on flood and landslide disaster in Malaysia. The aim of this paper was to provide input for a clearer understanding of these disasters and how public could be safe from these hazards.

Methods

This paper involved with secondary data which are collected from journal, proceedings, books, related agencies and internet sources. All the related information collected will be discussed critically and scientifically. All the discussion regarding disasters in this paper will be focused from year 1999 to 2007.

Discussion

Public in Malaysia is familiar with flood and landslide. These disasters have recently increased in frequency in certain areas due to human activity. However, Malaysia with rapidly-expanding economic cannot allow environmental disaster to expand significantly because severe disasters progressively threaten and weaken development (3).

i) Flood

Significantly, floods are the main disasters which cause the most problems and concern in Malaysia due to a combination of geographical, climatic, topographical, hydrological and human systems (4). Although floods are natural phenomena, uncontrolled development, indiscriminate lands clearing and other human activities increasing the severity of floods both the peak discharge and the time of concentration (5). Therefore, in Malaysia, news on communities affected by floods can be heard, seen and read almost every quarter of the year, a costly event every time it hits, confirming the worsening severity, frequency and impact of this particular natural calamity in this country.

Floods in Malaysia often categorised as monsoonal, flash or tidal floods. Due to floods, the effects may be felt immediately or on a long-term basis. The negative impacts of flood including threaten lives, disrupt social and economic activities and destroy properties, causes distress and recovery can be costly both to individuals and the Government, and deterred new investments in the flood prone area. However the challenging is, when water and sewage systems have been disrupted, safe water and food supplies are of great importance in preventing enteric disease transmission.

In Malaysia, a flood is most common environmental disaster for East Coast states such as Terengganu and Kelantan. In fact, it had become an annual affair for the two states to suffer from the year-end monsoon floods as a natural result of cyclical monsoons during the local tropical wet season that are characterised by heavy and regular rainfall from roughly October to March. Howev-

er in recent years, other states such as Sabah, Johor, Kedah, Perlis and Perak also had their fair shares of inundation, causing losses that ran into millions of ringgit (Fig. 1). Floods in Southern Johor were believed due to recent Global Warming effect because Johor is not within the usual monsoon affected zone.

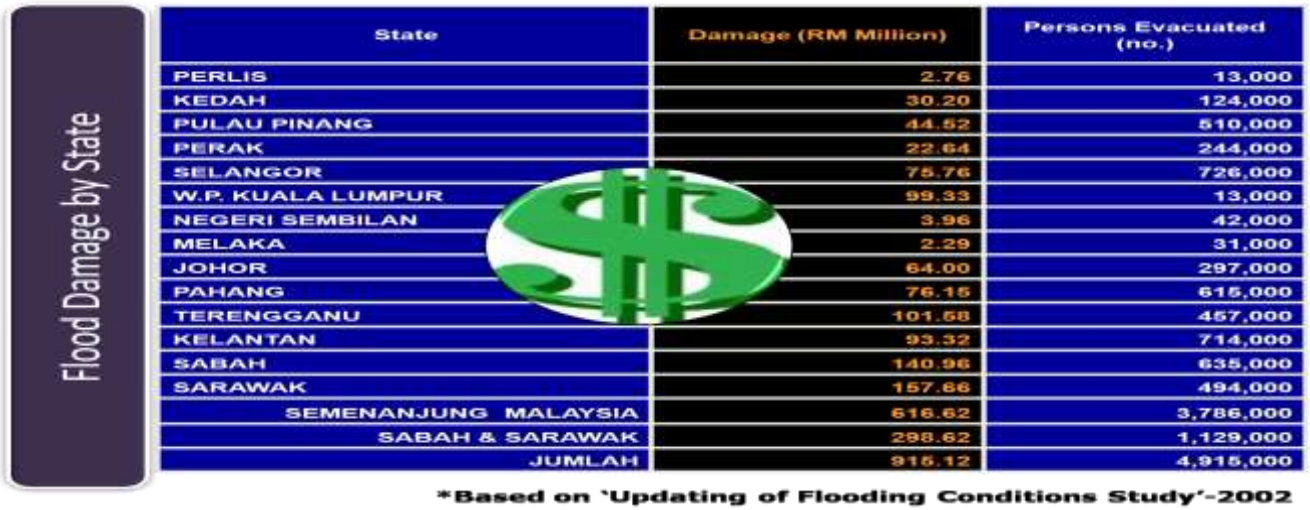

Fig. 1: Estimates of flood damages by state in Malaysia in year 2002

Source: (6)

According to Keizrul (7), flood hazards and disasters continue to escalate in frequency and magnitude mainly because human choose to occupy flood plains, ignore the dangers of such hazard zones, mismanage flood hazards, over-develop land and deplete natural resources (e.g. forests and hill slopes) at rates of change which natural systems can neither cope with nor adapt to. Poor enforcement of flood control regulations is another reason why flood hazards are on the decrease. Significant property damage, loss of business, inconvenience, stress and sometimes loss of life are the impacts of floods (4). Flood also increase risk for diseases, infection and other injuries as well. Hypothermia, leptospirosis, diarrhea, cholera, food poisoning and animal bites are common diseases related to flood. The major risk factor for outbreaks associated with flooding is the contamination of drinking-water facilities.

One of the major floods to hit the country must be the big floods of Johor in 2006 where more than 90,000 people evacuated, which also affected Pahang, involving the districts of the Pekan and Rompin with more than 20,000 victims relocated to safer grounds. In 2013, Pahang and Terengganu bore the brunt of the natural calamity. Unprecedented floods due to prolonged high intensity rainfall and land use changes in Kemaman and Kuantan pose serious threat to society. This factor has increased the frequency, magnitude and dimension of floods in those areas. Rapid pouring of volume of rain caused quick rise in the level of river's water and hence the discharge of outflow had to be increased. This high discharge of water could not be accommodated and hence devastating flood was generated which destroyed agricultural crops, caused loss of human lives and property. In Kemaman, Terengganu itself, flood evacuees at 46 relief centres numbered around 20,000. Kemaman town is almost paralyzed with no water and electricity supply and residents forced to evacuate their homes because their homes were submerged up to the rooftops. The flood in Kemaman, reached its peak on Dec 7 when more than 19,000 evacuees at relief centres had to endure a period of incommunicado when all roads were closed and communication with outsiders was not possible.

In order to mitigate floods impacts in Malaysia,Government has established the Natural Disaster Relief Committee in 1972 with the task of coordinating flood relief operations at national, state and district levels with a view to prevent loss of human lives and to reduce flood damage. Furthermore, the cost-benefit analysis method favours an environmentally- friendly flood-mitigation strategy in the form of a non-structural approach are also recommended because the structural methods are not a sustainable method in an objective environmental cost-benefit analysis assessment. Non-structural techniques encompassing flood-mitigation and prevention-related regulations - such as urban zoning regulations, revised construction standards or codes, rivers or streams protection, restoration or maintenance of floodplains and wetlands or mangroves are the best practical alternatives to minimize the flood impacts especially to society. Thus, new non-structural measures were introduced and the most significant being that required under *Manual Saliran Mesra Alam*. Compliance to this manual is now a mandatory requirement for all new urban development projects since 2001.Since the new millennium, the Department of Irrigation and Drainage Malaysia (DID) (6) has adopted the Integrated River Basin Development and the Integrated Flood Management approaches for its flood management programs. These will provide a balanced approach between structural and non-structural measures as well as higher levels of public participation.

ii) Landslide

Landslides are thus one of the most destructive natural disasters in Malaysia. Landslides in Malaysia are regular natural disasters which happen at the hillsides but only reported when they has significant impact. Many hills and their environs are already being developed and many hill projects are in the pipe line. This has led to many environmental problems such as soil erosion and landslides. Some of these problems have been exacerbated and turned into disasters due to the extremely fragile and sensitive nature of hill ecosystems. Landslides cause property damage, injury and death and adversely affect a variety of resources. However, among the public, there is not enough awareness of the hazards posed by landslides.

Landslides are a frequent occurrence in Malaysia with over 600 deaths recorded since 1961. The decade of the 1990s can be considered as the beginning of the period when hill slopes problems/landslides gained prominence in Malaysia because of a number of major, and in some cases catastrophic, landslides (8). Between 1993 and 2002, 26 landslides which causing 150 deaths and thousands to be evacuated, have been reported in the media (9). Records show that Kuala Lumpur (19.2%) and Selangor (16.6%) are the most landslide-prone areas, followed by Perak (13.4%) and Pahang (12.3%) (Table 1). The collapse of the 14-storey Block a of the Highland Tower condominium in December 1993 due to series of landslides was perhaps the most dramatic landslide incidence in the country. The collapse of Block One of the apartments caused the deaths of 48 people. Landslides are mass movements of rock, debris and soil down a slope because of land failure of the soil and rock materials that make up the hillslope and they are driven by gravity. The term 'landslide' encompasses events such as rock falls, topples, slides, spreads and flows (10). Landslides are typically associated with periods of heavy rainfall (in Malaysia, annual rainfall can reach as high as 4500 mm) and occur when the hill or mountainside is unstable and mostly likely to occur in areas where they have already occurred in the past. In Malaysia, high-risk areas with a history of landslides include Ulu Klang, Cameron Highlands and Lojing.

In Malaysia, most landslides or slope failure have occurred during or following short periods (<3hr) of intense rainfall (when total rainfall >70mm) or longer periods (>1 day) with somewhat continuous rainfall (11). The most common types of landslides in Malaysia are shallow slides where the slide surface is usually less than 4 m deep and occurs during or immediately after intense rainfall (12), in particular between the months of September to January. In terms of size, many of the Malaysian landslides can be termed as small to

medium (8). According to the NSMP, Selangor and Federal Territory have experienced the most landslides since the 1970s followed by Pahang, Penang and Sabah. Rapid urbanization, over-development and deforestation have further aggravated soil destabilization in hill slope areas is partly the cause of a majority of landslides in Malaysia.

Table 1: Series of major landslide in Malaysia (1996-2007)

Date	Location	Type and nature of Landslide/Slope Failure	No. of Death
August 1996	Orang Asli settlement, Pos Dipang, Kampar, Perak	Debris flow from erosion and logging activities along upstream of Sungai Dipang occurred during heavy rain	44
November 1998	Bukit Saujana, Paya Terubung, Penang	Massive rockslide	-
January 1999	Squatters settlement, Sandakan, Sabah	Shallow rotational slide. Heavy rain triggered landslide – buried a number of houses/huts	13
May 1999	Bukit Antarabangsa, Ulu Kelang, Selangor	Massive landslide	-
January 2000	Vegetable farm, Cameron Highlands, Pahang	Debris flow from upstream landslide and erosion washed away workers squatters	6
January 2001	Simunjan, Sarawak	Shallow rotational slide. Landslide occurred on vegetable farm – buried a number of houses at the toe of slope	16
December 2001	Gunung Pulai, Johor	Debris flow. Heavy rain triggered debris flow resulting from a number of small landslides along upstream of Sungai Pulai – washed away settlements along the river bank	5
November 2002	Hillview, Ulu Kelang, Selangor	Debris flow. Sliding/flowing of debris soil during heavy rain – toppled a bungalow at the toe of the hill	8
October 2003	Gunung Raya Road, Langkawi, Kedah	Deep-seated rotational slides. Landslide triggered by heavy and prolonged rain – buried a machine and its operator while debris clearing works were being carried out.	1
November 2003	Bukit Lanjan, North Klang Valley Expressway, Selangor	Rock fall/ rock debris	-
November 2004	Taman Harmonis,Gombak, Selangor	Debris flow. Sliding/flowing of debris soil from uphill bungalow project – toppled the back-portion of neighboring down slope bungalow after weeklong continuous rain	1
December 2004	Bercham, Ipoh, Perak	Rock fall – buried back portion of illegal factory at the foot of limestone hill.	2
May 2006	Ulu Klang, Selangor	Landslide due to collapse of retaining wall and retrogressive slope failures. Buried 3 blocks of longhouses.	4
November 2006	Bukit Serdang, Selangor	Landslide at Taman Bukit Serdang	-
March 2007	Precint 9, Putrajaya	Landslide	23 cars were buried under the debris

Source: (8)

Previous landslides such as the Highland Towers, Karak Highway, Taman Hillview, Hulu Langat and Bukit Antarabangsa had caused heavy personal and economic losses. The highest fatality for a single landslide was recorded on Dec 26, 1996 where 302 people were killed when debris flow caused by tropical storm Gregg wiped out several villages in Keningau, Sabah. According to

the NSMP, economic losses from landslides totalled almost RM3 billion from 1961 until 2007. Because landslides take a variety of forms and occur in a variety of setting, the key to predicting when they might occur or how they form and may evolve through time. Drainage and surface protection are generally the most cost-effective solutions.

The question is how safe are Malaysian from this type of disasters?

Disasters will continue to occur and most of environmental disasters are complex and cannot be fully prevented. Deaths, injuries, loss of property, ringgit loss in disruption of economic systems, social disruption and physic damage are common examples and impact. Adjustments cannot mitigate all risks, but measures can be taken to eliminate or reduce the possibility of trouble to make sure disaster situations and the management and coordination of response activities are unproblematic. If human adjustment to mitigate the risk of disaster totally successful, death and lost imposed by disaster is lessened.

According to International Federation of Red Cross and Red Crescent Societies Disaster Management (n.d) (13), disaster management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters. Generally, human can purposely adjust to the risk of environmental disasters by a change in location or resource use, actions to reduce loss or the redistribution of loss.

Flood, landslide, and other kinds of environmental disasters could have been less impact to the society if preparedness and awareness are increasing among all stakeholders. Preparedness is the main way of reducing the impact of disasters because these activities are designed to minimize loss of life and damage. Preparation of environmental management disaster plan required formulation, implementation and monitoring of environmental disaster protection measures during and after the disasters. Good evacuation plans, environmental planning and design standards for sure be mitigated of life and injury.

Ways must be found to ensure that a community is strengthened, becoming less fragile and less susceptible to disaster impact. In addition, ways have to be found to assist a community to survive despite receiving the impact of severe disasters (14). Furthermore, government agencies, technical and academic institutions, commercial interests, communities and individuals themselves must develop their corresponding competencies and effective capabilities in disaster management.

In order to protect the people in Malaysia from environmental disaster and minimise the effect as well, the following action are suggested:

i) Mapping of flood and landslide prone areas.

ii) Warning systems had been in place. In addition, early warning, forecasting and monitoring systems must be improved. Hence, unless the warning system is effective, no action or protective measure is likely to be undertaken.

iii) Establish the systems, resources and response capabilities needed to implement appropriate actions for protection of the civilian protection. A capability includes evacuation, sheltering and individual protection.

iv) Protective equipment such as safety jackets and face mask should be existed, available and in good condition to use for populations which is lives and exposed to environmental disaster areas to ensure that they are protected.

v) Emergency plans should be developed for all specific facilities such as schools, hospitals and nursing home to facilitate the evacuation process. So that special assistance can be provided especially for vulnerable people who really need it such as the handicapped.

vi) Practicing sound management of natural resources as a tool to prevent

disasters or lessen their impacts on people, their homes and livelihoods.

vii) Promote individual and community education and knowledge on that. Education is the least expensive and most effective way for disaster mitigation; even without sophisticated and expensive technologies for warning, people can escape and mitigate the disasters safely and sustainably (15). Awareness and education allow people to protect themselves in their lives. Understanding of disaster risks as well increases the effectiveness of early warning and policy implementation

viii) Integrate hazard assessment and disaster risk management into strategic planning and sustainable development

ix) Strengthen a policy for the preservation, conservation and sustainable use of ecosystems, biodiversity and forests. There is a need for change or restructuring of current policy and institutional arrangements and functions, including laws that need to be made more relevant, explicit and uniform. A consensus must be developed amongst all relevant parties involved.

x) Evaluate and provide determination to the environmental impact statements for development projects and prevention of ecological damage

xi) Encourage people to live in a way that doesn't hurt the environment

xii) Support companies that operate in ways that minimize damage to the environment

xiii) Restore damaged ecosystems to mitigate the disaster. For example, by planting trees on hill or mountain where forests have been cut down to preserve it from landslide.

In addition, Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) must be applying as well in project development. These methods are decision-making tools for mainstreaming hazard and disaster risk reduction strategies and measures into policies, plans and projects. They can be applied at national, regional and local level and in different sectors. Environmental assessments provide guidance in analyzing hazard and disaster risk-related consequences of proposed activities via their impact on the environment.

Conclusion

The environment is often seen as the agent or cause of a disaster or perhaps as the carrier. In a flood, for example, the "environment" behaves in ways that bring harm to the communities affected by them.Worldwide the impact of environmental disasters is rapidly growing. Surprisingly, many countries and development agencies so far do not consider these types of hazard and disaster risk in development planning, and lack sufficient strategies to plan, assess, prevent or mitigate the effects of extreme events. All this is very important because disasters have a major and long-lasting impact on people long after the immediate effect has been mitigated.

Nowadays, society becomes ever more rapidly vulnerable to environmental disasters due to the frequency and severity of disaster and concentration of populations as well. The resulting loss depends on the capacity of the population to support or resist the disaster. In its effort to cope with the future possibility of environmental disaster, community and its constituent's elements can take a variety of actions to reduce risk and uncertainty.

How safe are Malaysian from this types of disaster? Normally, humankind is capable of saving their self and Earth as well if they recover the principles of solidarity, complementarity and harmony with nature in contraposition to the reign of competition, profits and rampant consumption of natural resources. They also must strongly support a sustainable development and a sustainable land use concept in order to sustain

the environment from degrades. In addition, community-based disaster preparedness is essential in preventing and responding to the full array of environmental disasters in keeping human losses as low as possible.

Ethical considerations

Ethical issues such as plagiarisms, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, et cetera have been completely observed by

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