POLITICAL AND INSTITUTIONAL RESPONSES TO FLOODING IN PAHANG RIVER BASIN, MALAYSIA: LEARNING FROM FLOODING IN THE ELBE RIVER, GERMANY

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ABSTRACT

Natural disasters such as tornado, earthquakes, landslides, floods, droughts, etc. are global issues as they occur worldwide and their frequency, intensity and ferocity have been rising sharply in the recent decades. Flooding is the most serious and widespread of all natural disasters in the world, including in Malaysia and Germany. Floods in both countries bring severe impacts on the physical and socio-economic systems for both countries. Extreme rainfall in 2002 is the main constituent that resulted to higher water levels in some of tributaries of Elbe River and flash floods in the Saxony region. In Pahang State, Malaysia, flood is recurrent event largely caused by the northeast monsoon from November to March annually. Pahang experienced the worst flooding events in 1926, 1971, 2001, 2007 and 2014. While the floods wreak havoc and severe losses in Pahang (due to ineffective and slow responses), the flood impacts in German were minimal (due to appropriate and swift responses). This paper examines the applicability of lessons drawn from the flood events in Elbe River in Germany for improving the flood management mechanism of Pahang River Basin in Malaysia. There is an opportunity to learn from the experiences of flood management mechanism in Germany. As conclusion, even though, Malaysia and Germany have different institutional actors, instruments and responses towards flood events, both countries have instutional capacity and action in coping, control and manage the floods. Government, as key actor and policy-makers plays vital role in identification and evaluation of the potential risks of floods and to initiative the effective prevention, management mechanism and adaptation to flood. Equally, the role of other key stakeholders should also be incorporated into the national flood response mechanism to produce a comprehensive response strategy.

Key words: Flood Responses, Flood Management, Flood Losses, Elbe River, Pahang River.

Introduction

Recently, the incidence of natural disasters has been arising across the world (Cavallo and Noy, 2010). When this paper was written, an earthquake with magnitude of 6.4 hit Taiwan, unusual cold wave in East Asia and a snowstorm in Mid-Atlantic and Northeast United States in the early of 2016 which caused untold costs of destruction and affected thousands of lives. Natural disasters such as tornado, earthquakes, landslides, floods, droughts, etc. are global issue as they occur worldwide and their frequency, intensity and ferocity have been rising sharply in the recent decades. They are dreadful events as they are difficult for us to understand as we are not able to control over when and where they could happen.

Flood is one of the most deadly natural disasters (Alexander, 1993). Kron (2004), Douben and Ratnayake (2005) stated that floods themselves contribute about 20-30% of the economic losses and more than half of fatalities cases worldwide.According to WHO, floods is defined as sudden onset events or phenomena and they could sorted into different types of floods that may occur with different speeds such as flash floods, river floods and coastal floods associated with tropical cyclones, tsunami and storm surges. CRED (2008) define flood as surplus of overflow of water from an established watercourse that submerges land or the unusual accumulation of water on the surface because of excess rainfall and rise of the groundwater level above channel capacity. In 2014, there are 324 cases of natural disasters were reported (Table 1). Hydrological disasters marked the highest records with 153 cases, followed by meteorological disasters (118 cases) and geophysical disasters (32 cases). Climatological disasters marked the lowest record of 21 cases.

Floods are responsible for 20-30% of the economic losses caused by natural hazards worldwide and for more than 50% of all fatalities due to natural disasters (Kron, 2004; Douben and Ratnayake, 2005).

Table 1: Natural disaster occurrence and impacts: regional figures

Number of natural disasters in 2014	Africa	Americas	Asia	Europe	Ocenia	Global
Climatological	5	9	5	1	1	21
Geophysical	4	8	17	2	1	32
Hydrological	24	31	65	29	4	153
Meteorological	6	28	57	22	5	118
Total	39	76	144	54	11	324

Source: Annual disaster statistical review 2014: the numbers and trends

In this study, we will examine factors that facilitate the ability of local citizens, national and international political and institutions in Germany and Malaysia to carry out adaptation measures and flood mitigation. We will also equate factors that refrain the stakeholders from finding the solutions to flood management process.

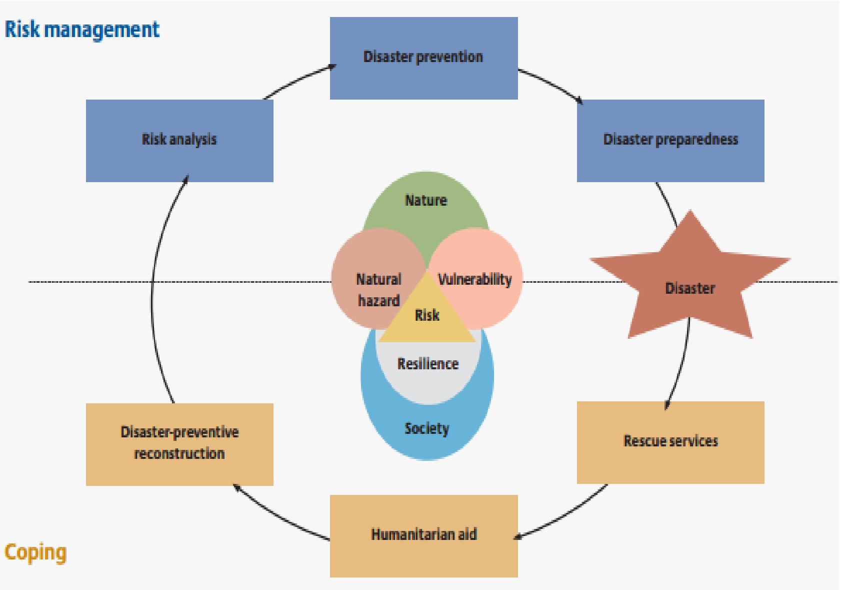
Disaster management concept

A disaster *is a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources* (UNISDR, 2009: p.13). According to Serje (2002), disaster is *a set of adverse effects caused by social-natural and natural phenomena on human life, properties and infrastructure within a specific geographic unit during a given period of time.* According to Drucker's (1974, 17), disaster management is defined as a process of *making people capable of joint performance by giving them common goals, common values, the right structure, and the ongoing training and development they need in order to perform and to respond to change*.

Natural disasters have direct or indirect effects not just on the people but also the socio-economic of the countries. There are four important components in disaster risk management model; risk analysis, disaster prevention, disaster preparedness and disaster-preventive reconstruction (Figure 1). Risk analysis analyse the relationship between the natural hazard and vulnerability of society with the aims to evaluate the potential damage and losses caused by natural disasters (BMZ Information Brochure 3, 2010). In the disaster-preventive reconstruction stage, past experiences, professional expertise and technology tools are important criterias in the risk reduction and reconstruction process during or after natural disasters(ibid). It is essential to take measures to engage multi-stakeholders (administration, policymakers, NGOs, private and public) to prepare against natural hazard in order to reduce or mitigate the risks and effects. Research by Chan and Parker (1996) has indicvated that appropriate response to dynamic flood hazard factors is crucial in minimizing flood losses in Peninsular Malaysia. Likewise, Parker et. al. (1997) have found that reducing vulnerability following flood disasters largely depend on appropriate flood response (during disaster) and reconstruction practices (after disaster).

Some problems with this Act can be categorized as follows: Applying vague and ambiguous expressions and words in context of the Act which makes it hard to executive and interpret, such as: the extent to which the Act covers unemployed peoples. The minimum period to pay unemployment insurance fee is six months which seems a short one, taking into account financial situation of relative sources. In the foresaid Act just employer has to pay the insurance fee which seems unfair to put total financial burden on employer`s shoulders while Government makes no contribution. Also there are other problems which this work will focus on to illustrate and propose solutions. The present study is to focus on Iran legal system in demission of unemployment insurance, taking in to consideration problems within Unemployment Act of Iran and finally come up with suggestions and recommendations.

Figure 1: Components of disaster risk management



Source: BMZ Information Brochure 3, 2010e: pp. 8

The case of flood in Pahang River basin, Malaysia

Though Malaysia is located geographically outside the "Pacific Rim of Fire" from the earthquakes, volcano and typhoons, nevertheless floods are the most common and devastating natural disaster in Malaysia (Chan, 1995), which has experienced in recent years some of the largest flooding events in its history such as flood in Pahang which occurred in 2013 and flood in Kedah and Perlis in 2010 which damaged about 45,000 hectares of rice fields (Chan, 2015). As shown in Table 2, tremendous flood events happened in Malaysia: 1886, 1926, 1931, 1947, 1954, 1957, 1965, 1967, 1970/1971, 1988, 1993, 1996, 2000, 2006/2007, 2008, 2009, and 2010 (Chan, 2012).

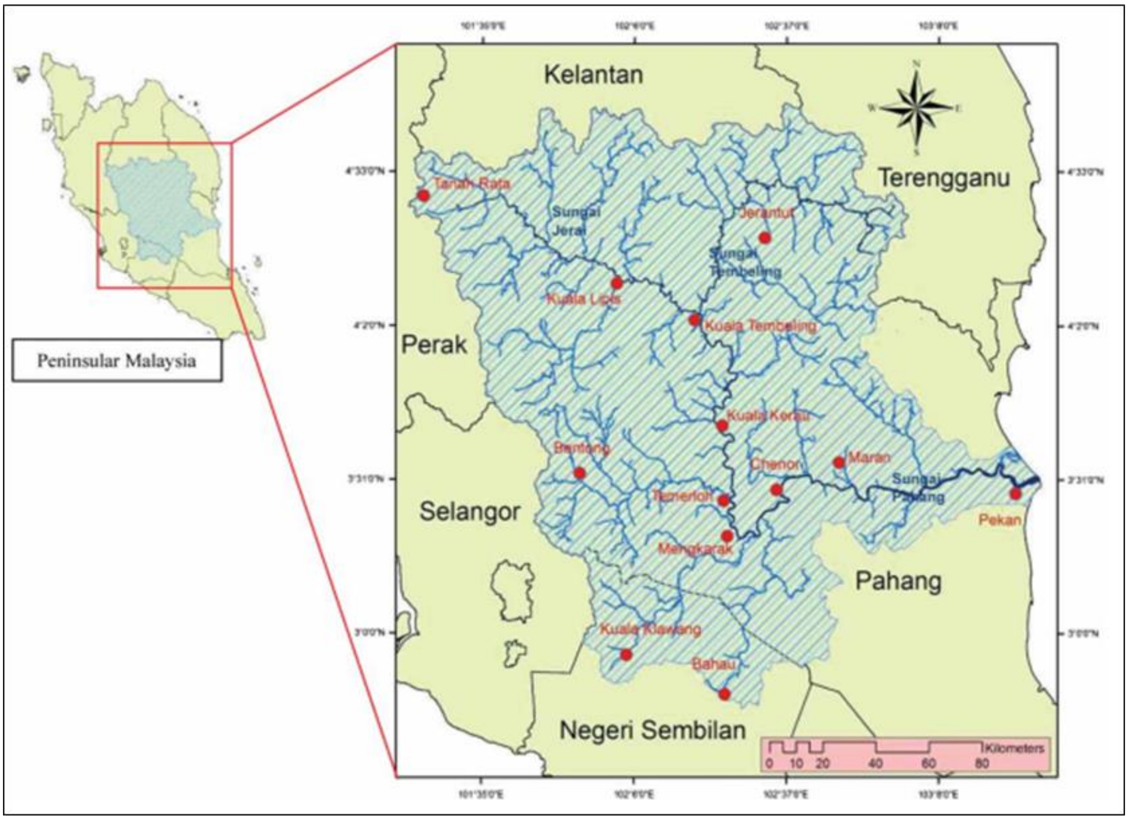
Table 2: Official flood loss estimates for major flood events in Malaysia

Flood Event (Year)	(Place)	Damage (USD million at 1996 prices)	Deaths	No.of Victims Evacuated
1886	Kelantan & Besut Rivers ("Storm Forest Flood")	Several hundred square kilometers of forest destroyed	NA	NA
1926	Most of Peninsular Malaysia	Damage to natural environment	NA	NA
1954	Johor, Terengganu	Hundreds of acres of padi	2	Thousands
1965/66	Besut, Kelantan-Terengganu	>30,000 acres of padi destroyed	NA	Thousands
1966	Perlis	NA	1	NA
1967	Kelantan River Basin	72.31	38	320,000
1967	Perak River Basin	56.04	0	280,000
1967	Terengganu River Basin	14.57	17	78,000
1971(December)	Kuala Lumpur	30.71	24	NA
1971(December)	Pahang River Basin	33.77	24	153,000
1979	Peninsular Malaysia	NA	7	23,898
1981	Kelantan State	NA	8	2,740
1982	Peninsular Malaysia	NA	8	9,893
1983	Penang State	0.20	0	NA
1983	Other Peninsular Malaysia	NA	14	60,807
1984	Batu Pahat River Basin	7.37	0	8,400
1984	Kelantan dan Terengganu States	NA	0	Thousands
1986	Peninsular Malaysia	11,96	0	40,698
1988	Kelantan River Basin	NA	19	36,800
1988	Other Peninsular Malaysia	NA	37	100,755
1989	Johor State	NA	1	Thousands
1989	Kuala Lumpur/Petaling Jaya	0.03	0	220
1991	Other Peninsular Malaysia	NA	11	NA
1992	Peninsular Malaysia	NA*	12	NA
1993	Peninsular	NA	22	17,000
1993	Sabah State	72.57	5	5,000
1995	Shah Alam/Kelang Valley	1.76	1	8,970
1995	Klang Selangor	NA	3	0
1995	Other Peninsular Malaysia	NA	4	14,900
1996	Sabah (June)	>100 houses destroyed	1	9,000
29.8.1996	Pos Dipang, Perak	97.8**	44	Hundreds
1996	Sabah (December)	NA	241***	23,000
30.12.98	Kuala Lumpur	NA	5	0
5-9.1.99	Penampang, Sabah	NA	6	4,481
11.1.99	Sandakan Sabah	NA	3	0
23.11.2000	Kg. La	NA	6	0
Dec. 2001	Kelantan, Pahang, Terengganu	Crop loss & property damage in millions USD; USD 0.65 million texts destroyed	6	>10,000
27.12.2001	Gunung Pulai, Johor	Mudslide swept away 4 houses	5	4 families
31.12.2001	Benut Marang, Terengganu	Crop loss & property damage	4	Thousands
Dec 2006 – Jan 2007	Johor State Kelantan State	USD 489 million Property Damage USD 17.28 Damage to Infrastructures	18	110,000
2008	Johor State	65 (Relief Costs)	28	34,000
November 2010	Kedah & Perlis States	Alor Setar Airport closed, railway line flooded, USD 8.48 million padi crop damage	4	50,000

Source: Drainage and Irrigation Department Malaysia, Malaysian National Security Council and major newspaper (1997)

Pahang River (440km) is the main river in Pahang Basin and situated in the east of Peninsular Malaysia and it is the longest river in state of Pahang and the Peninsular Malaysia The length of Pahang River Basin is 459km and has drainage area of 29,300 km^2. 27,000 km^2 drainage area is located within Pahang and only 2,300 km^2 is lies within Negeri Sembilan (**Figure 2**). Jelai River, Tembeling River, Semantan River, Teriang River, Bera River, Lepar River and Serting River are the main tributaries of Pahang River system. Lake Bera and Lake Chini are the two major lakes within Pahang River Basin. Both states have the rights to use water from the Pahang River Basin. Pahang River is important water resources for for agriculture especially in irrigation of rice and water supply in Pahang. The annual rainfall in Pahang River Basin is between 2,000 - 3,000 mm and majority of the rainfall and wet days are brought by northeast monsoon during November to February.

Figure 2: Pahang River basin delineation



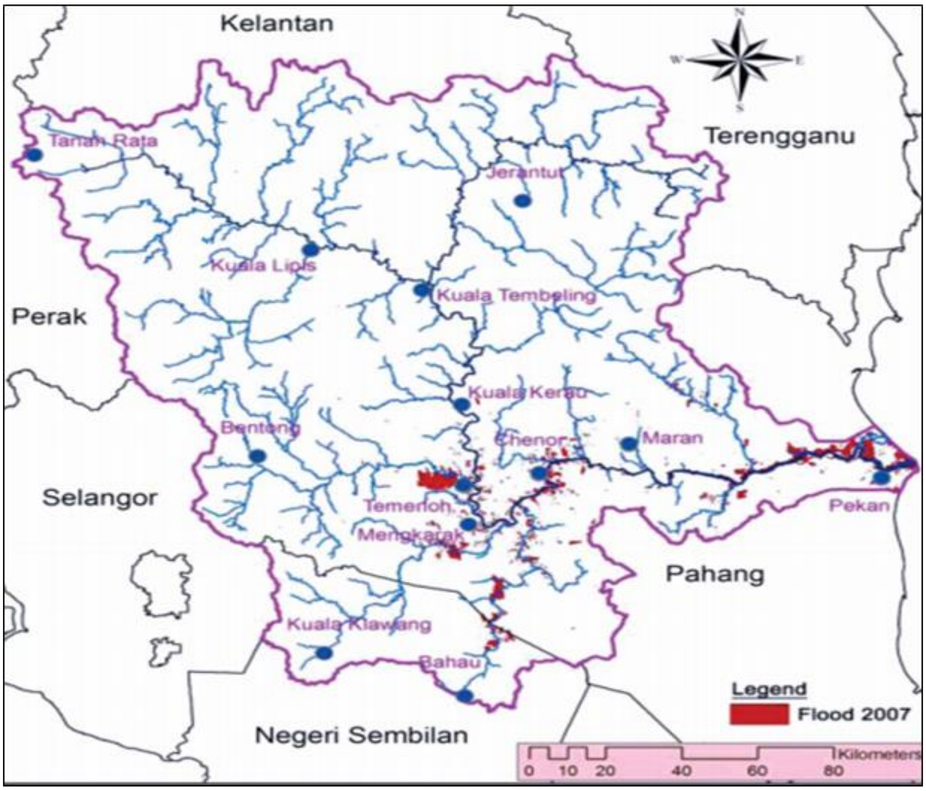
Source: Ghani et al, 2012

According to Tekolla (2010), flooding in Pahang river basin was also caused by uncertainities associated with improper development and planning of infrastructure, industrial activities, river management and deforestation. Lake Chini and Lake Bera are main natural catchment areas located in Pahang and both play important roles in flood prevention and control, regulation of waterflow in Pahang river basin (Tekolla 2010). According to Takeuchi,et al (2007), the lakes are under verge of ecological collapse as the water resources are disappearing due to uncontrolled deforestation, logging and improper planning of land use in the region (conversion of natural forests to palm oil plantation), agriculture and farming.

The flood event in Pahang River Basin

Flood is the ominous events in Pahang. Over the past decade, Pahang is one of state that is most frequently hit by flood disaster. Pahang experienced the worst floods events in 1926. Floods occurred in Pahang in 1971 was the second highest record in the last 45 years with economic damage estimated at US$38 million, 150 000 people become victims and 24 deaths(DID 1974). In 2007, Pahang River Basin experienced it third highest flood disaster with mean 8-days rainfall and causing the level of water exceeded the danger level at the Lubok Paku, Temerloh and Pekan stations. The economic damage from flood events was estimated at US$ 86 million by DID and a total of eight casualties (JICA 2011). Communities living at Pahang River Basin are evacuated to designated evacuation centres in Rompin, Maran, Kuantan, Pekan, Raub, Bera, Jerantut, Bentong, Temerloh and Kuala Lipis for 22 days. The flood prone areas in Pahang River Basin are shown in Figure 3.

Figure 3: Pahang River flood map in December 2007



Source: DID, 2007

Political and institutional responses to Pahang flood

Political and institutional responses are important elements in determining the adaptation towards natural disasters (Adger, 2000a; Bakker, 1999; Tol et al., 2003). From the study research, flood disaster management in Malaysia is based on a top-down centralized approach. The institutional framework with responsibility in the organization, coordination, evacuation, preparedness and prevention during the flood events in Pahang River Basin are the appointed federal, state and district disaster management and relief committee. After the severe flooding in Malaysia which causes high fatalities and losses in 1960s, Federal government implemented Natural Relief Committee in 1972 and Permanent Flood Control Commission in December 1971 to analyse short-term and long term measures to control, prevent flood occurrence as well as flood mitigation. (Ghani et al, 2012). There is lack of communication and participation at the community level as the flood disaster management is undertaken by the State or the relevant authorities. The official Flood Preparedness, Warning and Relief System in Pahang River Basin is not totally effective as it does not actively engage the relevant stakeholders in an integrated manner.

The case of flood in Elbe River, Germany

Elbe River (1100km) has drainage area of 150,000 km^2 with two-third of the drainage area is located in Germany and one-third of the drainage area is located in Czech Republic, and small divisions in Poland Austria. Extreme rainfall combined with soil precipation in 2002 is the main constituent that resulted to higher water levels in some of tributaries of Elbe River and flash floods in Saxony region (Figure 4). Elbe flood is one of the most destructive natural disaster in Germany and Saxony state is badly affected with a total flood loss of 6.2 billion € (Schwarze and Wagner 2004, p. 175). The Elbe flood in August 2002 caused severe damaged on infractures, economic damage of € 11.6 billion, 21 deaths, 110 injured people, 100 000 citizens evacuated and affected about 12 000 commercial entities (Thieken et al., 2006; WWF-Report, 2007). According to DKKV (2004) and Thieken et al (2007), the lack of knowledge the locals for flood preparedness and mitigation followed by incomplete flood warnings systems, bad maintenance of flood protection and prevention structures are main disadvantages in the flood risk management system.

Figure 4: Major rivers and cities affected by the August 2002 floods

Source: Risk management solutions, 2003.

Political and institutional responses to Elbe flood

Germany is part of European Union and has a federal system. The tasks, laws and policy-making are shared between the Federal government and state governments. The actors that involved in the Elbe Flood Aid are the Bundeswehr (German Armed Forces), the Bundesgrenzschutz (Bundespolizei, Federal Police), the Technische Hilfswerk (governmental technical aid organisation), the Saxon Police, Fire departments, German Red Cross, various non-governmental organisations and about 25 000 volunteers.

Aftermath of Elbe flood, Germany has launched Five-Point-Plan to improve the flood protection and management scheme (BMU 2003) which brought to the changes in the Water Resources Act, Town and Country Planning Code, Federal Regional Planning Act, Federal Waterways Act and in the Law governing the German Weather Service. The significant changes had led to EU Flood Risk Mangement Directive (FRMD) in 2007 (European Parliament 2007). Apart from that, in order to cope and reduce the financial burden caused by flood, there is significant increment for insured private households and companies in the form of building the precaution level and *behavioural risk prevention* (Thieken et al., 2007; Kreibich et al., 2005, 2007, 2011). EU Flood Risk Mangement Directive (FRMD) proposed catchment-wide flood risk management concept where sharing the information of flood-related issues are obligated by both states and nations (European Parliament 2007). It is important to unify the flood risk management rules and policies for certain catchment area (ibid). This concept is well accepted and carried out by International Commission for the Protection of the Elbe River (ICPER) and River Basion Community (RBC) Elbe for Elbe zone.

After the Elbe flood incident, reconstruction aid fund (*Sonderfond Aufbauhilfe*) of 7.1 billion € established by the German Federal government and states to assist the flood victims and reconstruction of the public infractures which are destroyed by the flood (Günther and Seidelmann 2007). State government of Saxony implemented emergency relief programme of 500 million € from its state's yearly budget (Sächsische Staatskanzlei 2003). Insurance companies such as Allianz AG help to accelerate the flood recovery by making the 1.8 billion available for the insured private households and companies (Petrow et al. 2006; Mechler &Weichselgartner 2003).

Swiss flood hazard mapping system with four zonations with coverage from residual risks to severe hazards were adopted by Saxony state with insertion of inundation area mapping of 500 years floods (Petrow et al 2006, p.726).

Discussion and conclusion

Flooding is the most catastrophic disaster event for both Malaysia and Germany even though the causes of the flood situation differ from one another. Malaysia and Germany have established their national plan in flood control, prevention, mitigation and coping. For flood prevention in Germany, EU Flood Risk Mangement Directive (FRMD) proposed catchment-wide flood risk management concept where sharing the information of flood-related issues are obligated by both states and nations which is an important tool to unify the flood risk management rules and policies for certain catchment area (European Parliament 2007). In contrast with Malaysia, the flood prevention measures are not well established as they are suffering from flood almost every year. However, recently, Department of Irrigation and Drainage which is responsible in flood management in Malaysia become more conscious with the importance of mitigation project in river basin rather than traditional flood management approach.

In terms of preparedness and mitigation, Germany has mainly prepared by modifying their Federal building codes and laws which prohibit construction of high building on inundated areas. However in Malaysia, flooding in Pahang river basin were also caused by uncertainities associated with improper development and planning of infrastructure, industrial activities and deforestation on inundated areas (Tekolla, 2010).

From the study, the flood incidence in Germany is less frequent as compared to Malaysia as the German government has implemented long term flood control mechanism with strong collaboration with the stakeholders (regional, state, local and communities). The flood disaster management in Malaysia is based on a top-down centralized approach and the appointed federal, state and district disaster management and relief committee are responsible in the organization, coordination, evacuation, preparedness and prevention during the flood events. There is lack of communication and participation at the community level as the flood disaster management is undertaken by the State or the relevant authorities. The official Flood Preparedness, Warning and Relief System in Pahang River Basin is not totally effective as it does not actively engage the relevant stakeholders in an integrated manner. Therefore, the best way is to integrate the existing community-based flood response system with inputs from NGOs into the official system towards enhancement of standard operating procedures (SOP).Better or more effective flood risk management and governance that includes inputs from public stakeholders especially from the NGOs at all disaster stages will lead to more holistic approach towards flood risk management in Pahang River Basin.

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