

FLOOD DISASTER MITIGATION IN MALAYSIA

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Abstract: The flood disaster is the most frequently reported disaster in Malaysia. It is also the most frequent and the highest percentage of natural disasters that occur around the world because of the climates change. Flood preparedness, flood mitigation, Emergency Response Plan (ERP) and flood recovery are the phases in the flood disaster management cycle that helped the federal government and states government to overcome the flood disaster. Flood disaster management is actually a systematic process and guidelines to the government to mitigate the impacts of the flood disaster, to response the disaster and to recover after the disaster impact. It also becomes a preparation to the nation and community to face the impact of flood disaster toward our economic, social and physical livelihood. Flood disaster mitigation is really important as it is possible to prepare or at least mitigate damage that is brought upon by flood disaster. The aims of this paper review are to explore the existing knowledge on flood mitigation and to identify methods of flood management currently applied. The paper review is based on secondary data to give comparison and recommendation in achieving the objective.

Keywords: Flood preparedness; flood mitigation; Emergency Response Plan (ERP); flood recovery; flood management.

I. INTRODUCTION

Currently, in December 2019 our beloved country Malaysia was affected with flood disaster due to heavy rain and northeast monsoon. This flood disaster is like no ending saga and becomes nightmares to all Malaysian that were affected. [1] Eight of the states in Malaysia were affected by the floods and 14 flood disaster cases were reported. The flood disaster become the most frequent disaster has been reported compared with other disasters.

Every year, Malaysia becomes vulnerable to the flood disaster because of the monsoon season and heavy rain. [2] Monsoon season can be described as Southwest Monsoon which means from May to September and Northeast Monsoon which is from November to March. The Southwest Monsoon will cause the relatively dry season to entire states except for Sabah and the Northeast Monson will cause the humid season to entire states that lead toward the floods disaster. The monsoon transition period will occur from the end of March until the early of May and October to the middle of November. This monsoon transition period will cause the feeble wind from various directions that lead the entire states to have thunderstorms in the evening.

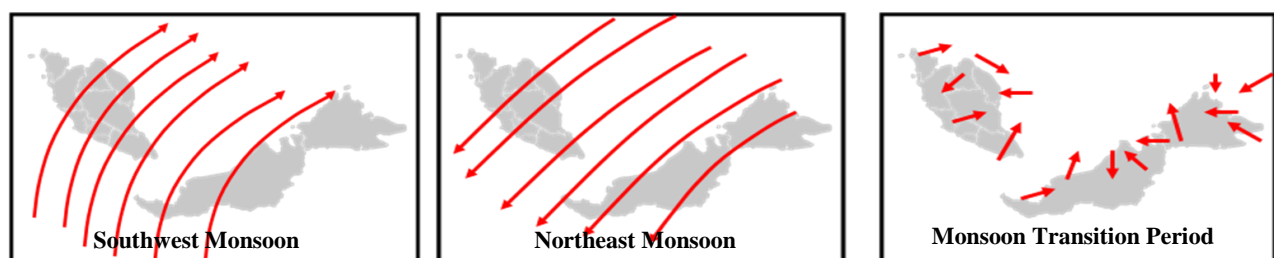


FIGURE 1: TYPE OF MONSOON SEASON [2]

Flood disaster will occur when inadequate drainage systems are unable to channel the water flow properly. The overflow of the rivers also a major reason for occurring the flood in the city. Frequency of these events will occur toward the end of the year, northeast monsoon causes massive heavy downpours of rain, particularly in the eastern states. Due to its relative regularity, flood mitigation, forecasting and warning system efforts have been undertaken by various agencies to minimise the impacts brought by floods.

II. PROBLEM STATEMENT

Flood disaster is the most significant natural hazard in Malaysia that causing considerable damage to properties and loss of lives. The monsoon season will cause heavy rain that creates floods. Every year Malaysia is facing the same problems and issues due to flood disaster. This thing is like an annual event that all Malaysian residents that live in the big city, near to coastline and rivers must face it. This disaster just like can't be solved and sometimes it becomes worse. If the flood disaster management in Malaysia is not properly managed, it will somehow lead to creating more disaster in the future.

III. LITERATURE REVIEW

[3] Floods disaster has 108 events that affected more people than any other type of natural hazard in the 21 century, including 2018. Major floods were reported in other countries such as Somalia, which is already suffering from ongoing conflict, over 700,000 people were affected by flooding, while in Nigeria, flooding cost 300 lives and impacted nearly four million people. Heavy rains in Japan caused the deadliest floods since 1982 and killed 230 people. [3] The August flood in Kerala state in India was the largest flood event of the year, with 504 killed, and two-thirds of the state's residents affected over 23 million people. From the data, it shows that flood disaster is a global disaster and become a problem to all country that affected.

[4] Mentioned that flood is the most common and repetitive natural disaster in the ASEAN region. For instance, flood events are the most frequent when compared to other natural disasters like earthquake, drought, landslide, typhoon, volcano and tsunami. From 1987 to 2016, 498 flood events were reported, which is equivalent more than 16.6 events per year in comparison to other disaster types with less than 9.6 events per year (typhoon: 9.6; landslide: 3.3; earthquake: 3.2; volcano: 1.5; drought: 1.3) [4]. During this 30 year period, there were a total of 498 flood events in the ASEAN region and 17,719 deaths were reported, with a total of 62.2 billion US dollars in damages. Therefore, it is obvious that the establishment of flood mitigation and countermeasures should be an urgent task in the ASEAN region.

TABLE 1: ASEAN FLOOD STATISTICS DURING 1987-2016 [4]

Country	Number of Events	Total Deaths (persons)	Total Affected (persons)	Total Damage (1,000 USD)
Brunei Darussalam	0	0	0	0
Cambodia	18	1,641	13,275,587	1,419,100
Indonesia	145	4,759	7,494,336	6,706,909
Lao PDR	19	153	3,907,011	153,878
Malaysia	37	197	865,899	1,417,000
Myanmar	22	622	3,536,342	257,655
Philippines	120	2,280	26,926,207	3,527,402
Singapore	0	0	0	0
Thailand	65	3,443	48,666,009	44,621,108
Vietnam	72	4,624	24,873,245	4,111,507
ASEAN	498	17,719	129,544,636	62,214,559

[5] Find out that floods are the major natural disaster threat facing Malaysia. Landslides and droughts are also significant, although most prevalent in the Eastern part of the country. Based on its geographical location, Malaysia is less vulnerable than other parts of the region. The end of 2014 downpour and floods were the worst ever in the country's history, affecting more than half a million people. [5] Damage to infrastructure alone was estimated at 670 million USD (RM2.851 billion). State such as Johor, Kedah, Negeri Sembilan, Pahang, Perak, Perlis, Sabah, Sarawak, and Terengganu was affected by flooding in December 2014.

[6] Finding according to Figure 2, huge flood damage was recorded in 1996 where floods were brought by Tropical Storm Greg in Keningau resulting huge damage in the flood area. In 2006 and 2007, a massive flood in Malaysia flood disaster history stroked four states in Peninsular Malaysia that are in Johor, Pahang, Melaka and Negeri Sembilan

resulting in huge damage approximately 400 million USD. And last but not least was the Yellow Flood that hit Kelantan, Terengganu and Pahang in 2014 resulting in approximately 732 million USD damage losses [6]. It is the worst monsoon floods affecting the east coast of Peninsular Malaysia, especially in Kelantan where 540,000 people were affected.

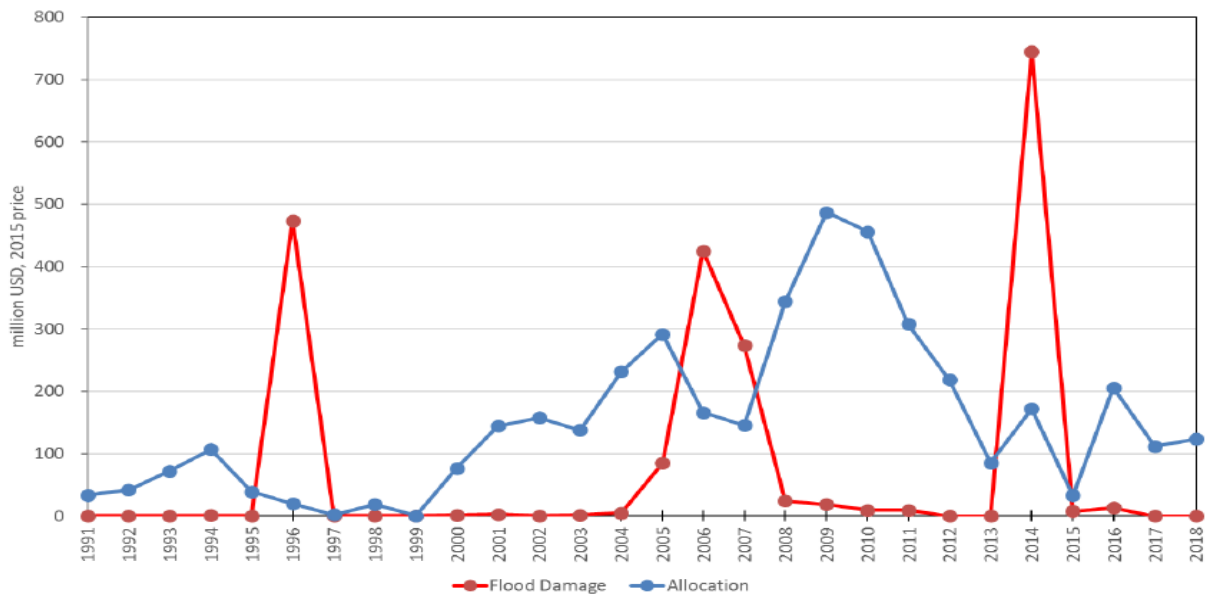


FIGURE 2: FLOOD MITIGATION BUDGET AND DAMAGE LOSS DUE TO FLOOD IN MALAYSIA FROM THE YEAR 1991 - 2018 [6]

IV. DISCUSSION

The graph from Figure 2, shows that the total budget allocation for floods mitigation for 28 year is approximately 4.3 billion USD and the total damage due to the floods is approximately 2 billion USD. While the average total of allocation for flood mitigation is approximately 153 million USD and total damage due to floods is approximately 72 million USD. From the data that has been analysis observed, it can be concluded that the budget allocation for flood mitigation must be consistent or higher than usual to mitigate the flood damages loss. If the budget allocation for flood mitigation is low, it will cause severe damages.

From the photos that have been shown in Figure 3, we can see clearly that the core problem that caused floods is our drainage system. Even though the heavy rains have stopped, the floodwaters still remain and take time to recede. Malaysia drainage system is still unable to flow the water and channel it effectively although some of the areas have been facing the same issues every year. The drainage system is very important to keep the stagnation water to flow properly and it needs to be upgraded if the area is frequent to have flooded.



FIGURE 3: EXAMPLES OF FLOOD AFFECTED AREAS

A. Flood Preparedness Plan

This system in Figure 4 is the Malaysian current method for early warning system for flood disaster that been used to examine and evaluate the data about rains and weather [7].

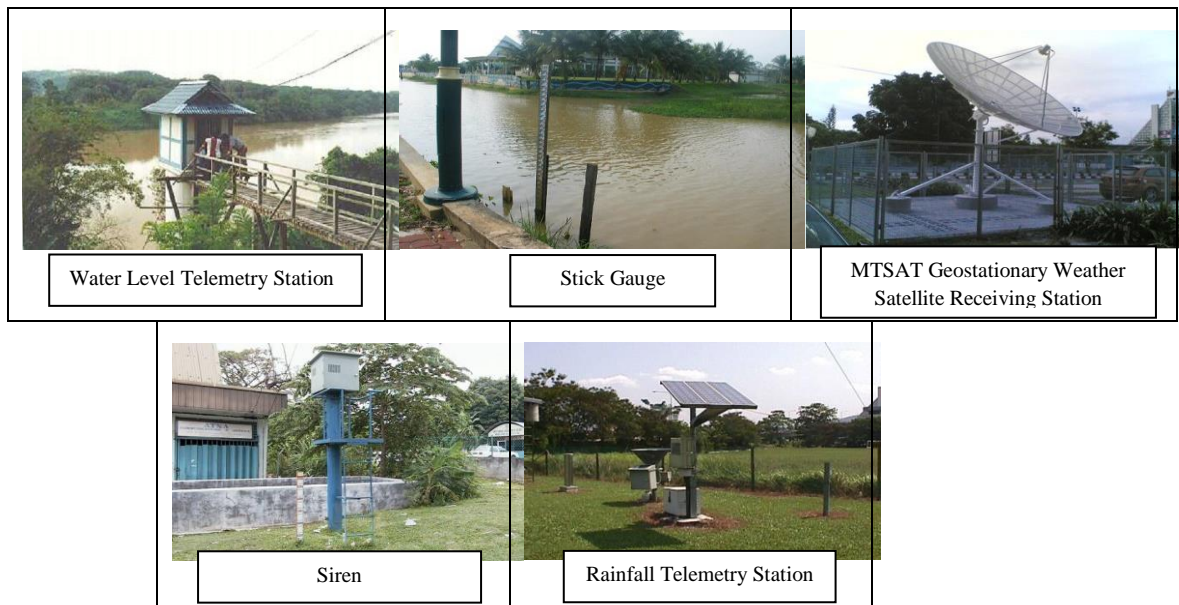


FIGURE 4: FLOOD EARLY WARNING SYSTEM [7]

B. Flood Mitigation Plan

Flood Mitigation Plan (Rancangan Tebatan Banjir) is one of the Malaysia government efforts to mitigate flood but it only focuses on economic growth areas. Figure 5 has shown the current flood mitigation infrastructure in Malaysia [7]. However, this infrastructure still is not enough to mitigate the flood disaster.

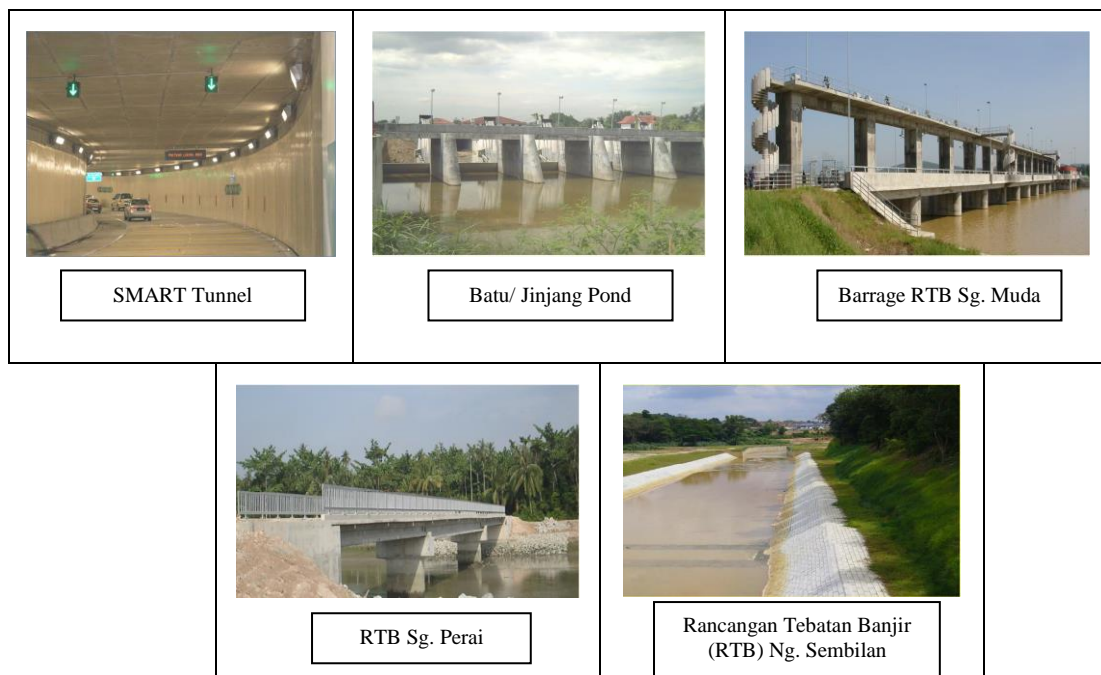


FIGURE 5: DID FLOOD MITIGATION INFRASTRUCTURES [7]

C. Emergency Response Plan (ERP)

[8] The flood has been categorised as a disaster incident. Due to the worst flood disaster incident in 2014 occur, The National Security Council (NSC) has officially formed a body as National Disaster Management Agency (NADMA) on 1 October 2015 to take responsibility in coordination the disaster management in Malaysia. Example in Figure 6 shown how NSC will response and manage the disaster incident in Malaysia. The federal and states government need to follow the directive as a guideline if the disaster occurs.

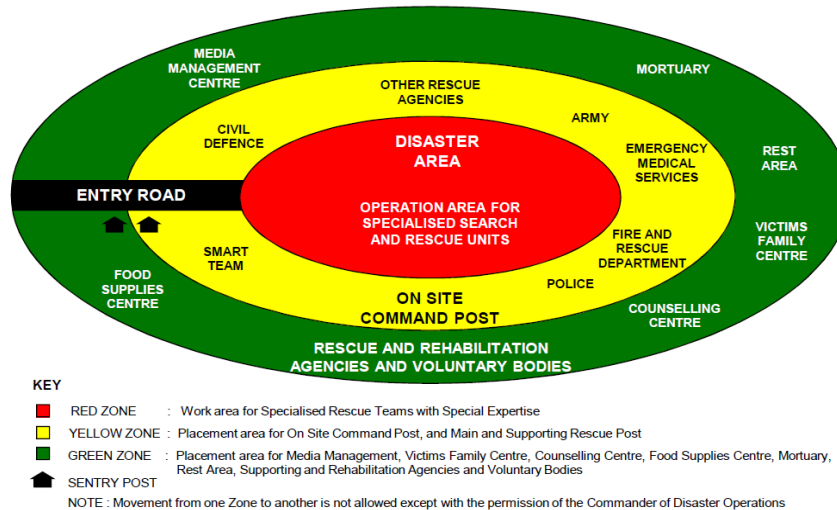


FIGURE 6: NSC ERP CHART [8]

D. Flood Disaster Recovery Plan

The recovery and rehabilitation programs for flood disaster must be implemented immediately after a disaster incident occurs. Every Government Agency, statutory bodies, private parties and voluntary bodies involved is responsible for performing the damage assessment as well as recovery and redevelopment of public infrastructure under the field their respective powers. Districts Disaster Management Committee (DDMC) and States Disaster Management Committee (SDMC) are responsible for evaluation, planning and acknowledgement to Central Disaster Management Committee (CDMC) on the proposed recovery program and redevelopment taking into the concept of disaster risk reduction. CDMC is responsible for deciding the recovery and redevelopment program that will be implemented and designate a government agency or relevant party to its implementation [8]. However, sometimes the recovery does not happen according to the plan especially when there are interventions of political interest. For those working in the private sector, not all the company has a disaster recovery plan unless the government makes it into regulation.

V. RECOMMENDATION

Malaysia needs to learn more about flood mitigation plan from a very experienced country such as the Netherlands that able to manage the flood disaster. Netherlands flood mitigation should be followed by the Malaysian government to mitigate flood disaster because Netherland government spends millions of dollar in order to improve their flood protection. [9] Mostly the land surface in the Netherlands is below sea level and if they don't take seriously about flood mitigation maybe the country will be drowned and disappear from the world map. To prevent that thing from happening, their government put a very high priority on flood protection along the coast and rivers [9]. Figure 7 is an example of the Netherland flood protection system. Some of the systems are already being used by the Malaysian government but it's not comprehensive to all states.

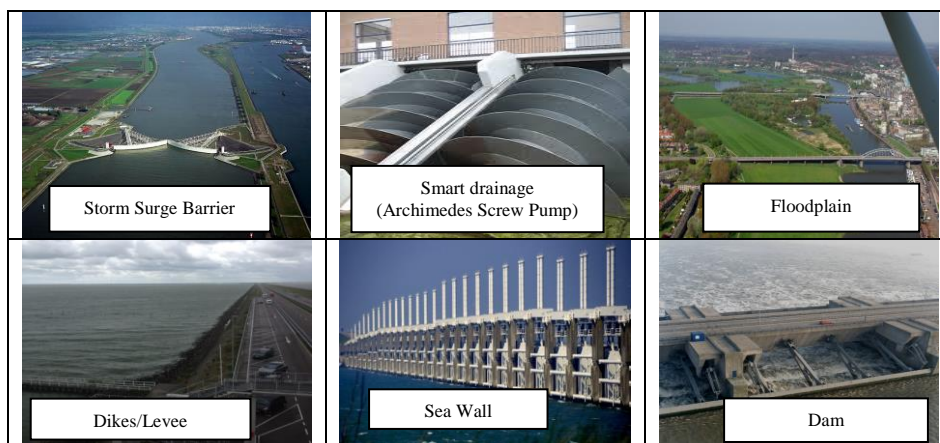


FIGURE 7: EXAMPLE OF NETHERLAND FLOOD PROTECTION SYSTEM

Japan flood mitigation infrastructure also is a good way to learn by the Malaysian government and DID. [10] The underground discharge channel shown in Figure 8 is a mechanism to drain water from flooded residential areas into five gigantic vertical shafts built below ground and then release it into rivers through an underground tunnel connecting the shafts.

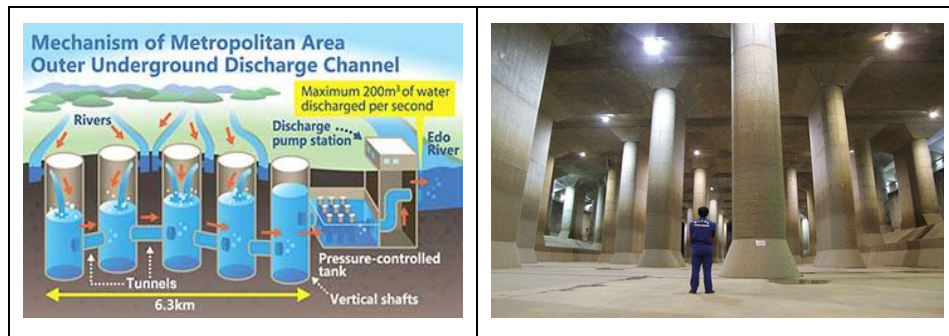


FIGURE 8: UNDERGROUND DISCHARGE CHANNEL [10]

From the observation, the flood protection system from the Netherlands and Japan are proven effective due to the successful flood mitigation and reduce damages. The drainage system in Malaysia needs to be upgraded especially in the rural area, public road and plantation area. The location of Figure 9 is an example of public road drainage system at the Kota Tinggi area which is lower to the ground and prone to the flood disaster if there is heavy rain. These problems are repeated every year and there is no action from the state DID or districts authority to solve the problem. If the federal government give a limit budget to the flood mitigation, my recommendation is the DID need to focus on enlarging or upgrade drainage systems in our public roads and plantations especially in the rural area that is frequently reported to flood.

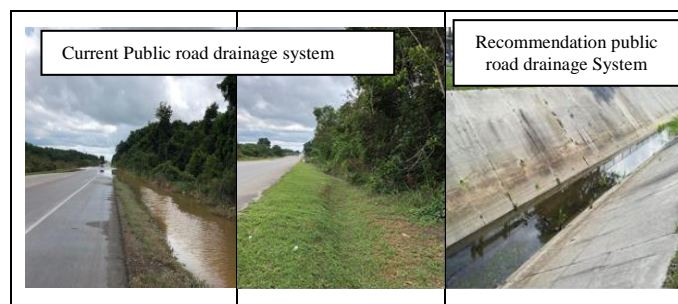


FIGURE 9: EXAMPLE OF A PUBLIC ROAD DRAINAGE SYSTEM

[9] Another recommendation that humans need to provide space for the flood to flow and when they occur floods must be managed effectively. The effective way to reduce the flood damages and flood protection costs is to restore the natural floodplains that contain the river floodwaters [9]. Floods have become a reason to restore rivers rather than the dam or levee. Many who have traditionally suggest structural solutions to flood protection are increasingly support the idea that rivers need to be given space to flood to flow. The width of the floodplain will make the floodwater to channel effectively. The figure 10 shows the floodplain structure and the Figure 11 show that Malaysia has 44 of rivers [11] that are prone to flood, by creating the floodplain and increase the river depth in the prone area, the flood will flow properly in the space provided.

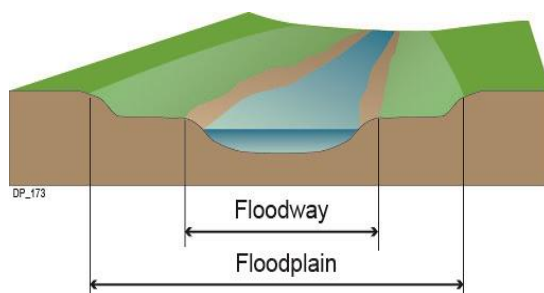


FIGURE 10: EXAMPLE OF FLOODPLAIN

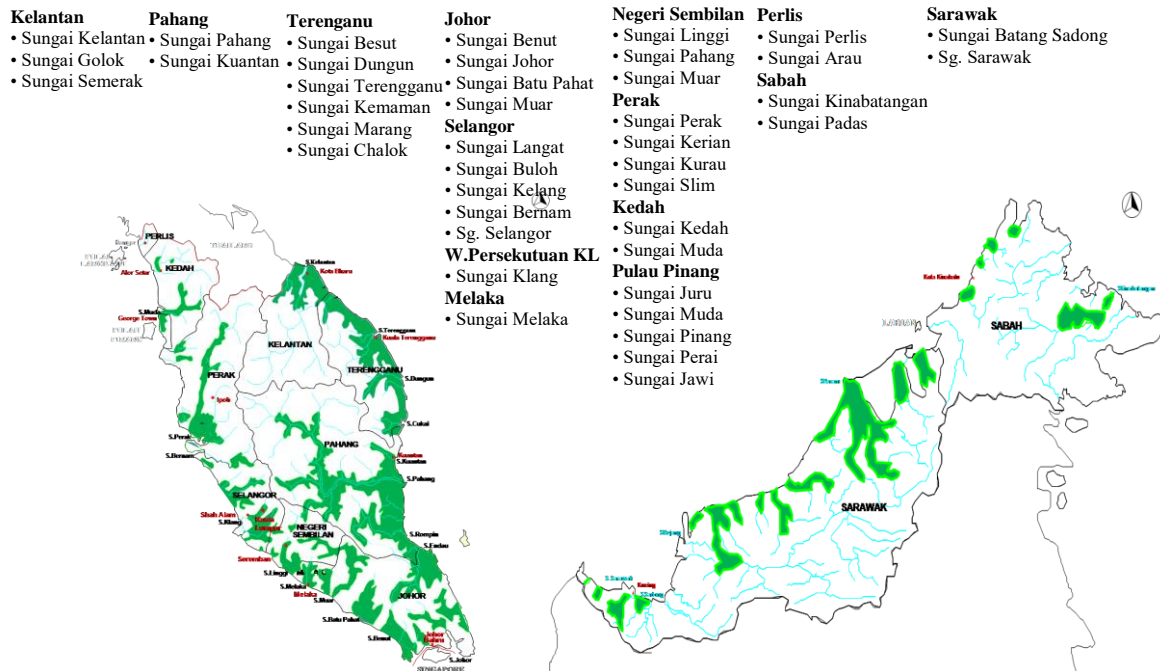


FIGURE 11: LOCATION OF THAT FLOOD PRONE AREA IN MALAYSIA [11]

VI. CONCLUSION

Malaysia flood history has proved that the poor and neglect of flood mitigation may lead to a disastrous flood in flood prone area. The new government needs to learn from the past incident to make sure the past ignorance and mistakes will not be repeated again. The current government needs to be serious in flood management especially in flood mitigation plan. If the government increases the budget on flood mitigation, it will reduce the flood and its damages. The flood can be a disaster if the government can't control it and it also will not be a disaster if the government knows how to manage and control the flood.

If the governments can't effort to spend money on expensive technology to control the flood, at least they can use a natural method to mitigate it such as provide a space for floodplain in every river that flood prone in Malaysia. The governments also can take a proactive measure to relocation aid and buyout funding for residents those living in floodplains. This project will take a long time to complete but at least the government already started to improve our flood disaster mitigation plan and in the future, the government can mitigate the flood disaster and its damages. A good decision today will make a better tomorrow.

The government needs to increase the budget to the DID to build and develop more flood mitigation infrastructure in all states in Malaysia without discrimination, despite having different political views. The DID needs to introduce a specification for a drainage system standard in Malaysia that needs to be followed by contractors and land developer if they want to develop the areas. The flood disaster needs to be mitigated by an effective system that is implemented by the government such as Netherland and Japan. If Malaysia can mitigate the flood disaster, our country will become guidelines to another developed country. The government needs to implement The Mitigation Plan (RTB) in all areas that affected to flood not only focus on economic growth areas.

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