

VOLUME 1: DEVELOPMENT OF NATIONAL WATER AND CLIMATE DEVELOPMENT PROGRAMME



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1. SCOPE

1.1 Water Resources

The availability of abundant water resources is due to the high annual rainfall (MNRE, 2015). The National Water Resources Study (2000-2050) reported that the country receives about 973 billion cubic metres of water from rainfall annually. From this, total surface runoff is estimated to be 496 billion cubic metres per year. About 414 billion cubic metres would return to the atmosphere annually through transpiration and 63 billion cubic metres as groundwater recharge. Studies indicate that the rainfall is unevenly distributed across states in Malaysia. Shorter rivers and small catchment areas results in flood at low-lying and coastal areas due to long duration and high volume of rainfall (Sonu et al., 2018). However, smaller catchment areas also lead to water stress and drought. As surface water from rivers and reservoirs provide approximately 97% of the nation's water demands, the management of forests as water catchment areas is important to ensure a sustainable source of water. The demand for water is projected to increase due to growing population and economic growth. The Tenth Malaysia Plan (2011-2015), which is the main five-year socio-economic development plan for the country, stressed the need for a water resources policy that charts the future course for the water sector in Malaysia.

Endorsed by the Cabinet in 2012, the National Water Resources Policy (NWRP) for Malaysia is intended to act strategically towards ensuring that the demand for water by all user sectors is met in terms of quantity and quality for both man and nature. It provides clear directions and strategies in water resources management to ensure water security as well as sustainability. Its four focus areas are water resources security, water resources sustainability, partnership, and capacity building and awareness.

1.2 Water Resource Management

Uncertain climate change and condition such as more extreme dry and wet seasons, fluctuating distribution and volume of rainfall, unpredictable droughts, higher sedimentation of rivers and rainfall-associated landslides cause difficulties in developing and sustaining a sound water management regime. Apart from the climate-induced constraints, the Federated governance system, which accords management of forests and water resources to the States, continues to pose a challenge in the implementation of comprehensive policy and legislation at the State level in support of the National Water Resources Policy and its component Integrated Water Resource Management, Integrated River Basin Management and Integrated Flood Management plans.

Inter-basin water transfer projects are being implemented to supply water to areas experiencing water stress because of high economic and population growth as well as spatial and temporal shifts in rainfall distribution. This is conducted to ensure adequate and safe water supplies. Although expensive, these multi-billion Ringgit infrastructure investments are necessary to address water resource needs under a future climate regime. Additionally for urban areas, the feasibility of large-scale rainwater harvesting and utilisation system is being assessed. Therefore, demand-side management such as minimising loss of non-revenue water, water tariff restructuring along with public awareness building to encourage water conservation needs to be pursued aggressively. Water saving technologies and assessment of the viability of alternative water resources would further require sound technology assistance. Additional funding for research and development in water saving techniques and improving water quality is also needed.

1.3 Water and Climate Change

The changes in the climate pertaining on water-related problems are perceived to influence in the increase of frequency and intensity (Guo & Senior, 2006; Collins & Knight, 2007; Sanchez et al., 2009; Lioubimtseva & Henebry, 2009; Schuster et al., 2012; Momcilo et al., 2017). Thus, Global Water Partnership (GWP) is responding to the climate change and water related Sustainable Development Goals (SDGs) through the global Water, Climate and Development Program (WACDEP). WACDEP contributes to improved resilience, through enhanced technical and institutional capacity, and predictable financing and investments in water security and climate change adaptation (Global Water Partnership (GWP), 2018). WACDEP targets over sixty (60) countries in Asia, Africa, Europe, Latin America, and the Caribbean WACDEP is developed and implemented to support countries in developing and implementing their National Adaptation Plans (NAPs). Besides outlining and delivering on their Nationally Determined Contributions (NDCs) in line with Paris Agreement, and achieving the Sustainable Development Goals (SDGs), with a focus on SDG 6 on water (GWP, 2018).

The WACDEP was implemented in Southeast Asia since 2014 by GWP-SEA. The implementation of activities have influenced largely on the improvement of climate change between 2014 and 2016. Global Water Partnership – South East Asia (GWP-SEA) has indicated agreement in leading WACDEP 2017-2019 in the South East Asia region to a mutual consensus as the scope of water security and climate change is vast parallel to the outcome of WACDEP activities from 2014-2016 (GWP, 2018). Based on the analysis that has been conducted by all eight (8) countries in SEA (Indonesia, Malaysia, Vietnam, Thailand, Myanmar, Lao, Cambodia, Philippines) it was agreed that related to water sector, floods and droughts is considered as the major concern due to climate change and therefore

should be the anchor of WACDEP in South East Asia (GWP, 2018).

1.4 Water and climate change in Malaysia

Malaysia is a nation located in Southeast Asia and together with its territorial waters lie between 0° 51' N and 7° 33' N, and 98° 01' E and 119° 30' E. It consists of 13 states and three Federal Territories (Ministry of Natural Resources and Environment Malaysia (MNRE), 2015). Eleven of the states and two of the Federal Territories (of Kuala Lumpur and Putrajaya) are in Peninsular Malaysia, and these are separated by the South China Sea from the states of Sabah and Sarawak in the island of Borneo. The Federal Territory of Labuan consisting of the whole island of Labuan is located off the coast of western Sabah. Malaysia has an area of approximately 330,803 km², with about 5,267 km of coastline and over 879 islands (MNRE, 2015).

The topography of Peninsular Malaysia ranges from coastal areas to mountainous regions. It has a land area of approximately 132,631 km² and a coast length of about 1,938 km (MNRE, 2015). Its north south extent is about 746 km and its maximum east-west width is about 315 km. The topography and the monsoon winds are greatly influenced by the central rainfall distribution. Malaysia is fortunate with an annual rainfall, ranging from about 2,000 mm to 4,000 mm. The east coast of Peninsular Malaysia, northeast of Sabah and southern Sarawak often experience heavy rain for three consecutive days and at times resulting in severe floods during the northeast monsoon (MNRE, 2015). On the other hand, the southwest monsoon experiences less rain. During the inter-monsoon season, heavy rain with thunder storm is often experienced in late afternoons and evenings. As Malaysia experiences equatorial climate, uniform diurnal variations of temperatures often occur throughout the year. The daily mean temperature is between 26°C and 28°C. At the lowlands, temperatures are between 22.5°C during the night and 33°C during day time. A gradual increase in the temperature is

observed over the past 43 years (MNRE, 2015).

Table 1 shows the consequences of climate change caused by the increase in temperature, sea level as well as reduction in rainfall magnitude in Malaysia.

Table 1: Major Aspects of Climate Change (CC) in Malaysia

CC Parameters	Impacts & Vulnerability	CC Parameters	Impacts & Vulnerability
Temperature Rise	<ul style="list-style-type: none"> ▪ Agriculture yield and crop productivity ▪ Heat transfer in cooling facilities ▪ Transportation efficiency ▪ Vector capacities & transmission of diseases ▪ Energy requirements ▪ Peat/bush fires and haze 	Increase Rainfall Magnitude	<ul style="list-style-type: none"> ▪ Floods ▪ Erosion ▪ Landslides ▪ Water contamination ▪ Diarrhoeal diseases ▪ Capacity of the vector diseases
Sea Level Rise	<ul style="list-style-type: none"> ▪ Coastal flooding ▪ Agriculture and aquaculture socio-economic losses ▪ Saline intrusion ▪ Aquatic life 	Decrease Rainfall Magnitude	<ul style="list-style-type: none"> ▪ Droughts ▪ Water supply ▪ Crop productivity ▪ Power generation ▪ Water contamination ▪ Diarrhoeal diseases ▪ Capacity of the vector diseases ▪ Peat/bush fires and haze ▪ Subsidence

Source: (Azuhan, 2017)

1.5 Climate change impact on flood

The change in the pattern climate change as well as the impact has been a matter of interest globally and in Malaysia as well. Malaysia experiences equatorial climate described by hot and humid weather all year round. The Southwest and the Northeast Monsoons influences the annual climate variability. The Southwest Monsoon occurs in the months of April to September while the Northeast Monsoon occurs from October to March (Ab Rahman et al., 2013). Climate change is perceived to increase the high flow in the watersheds of Kelantan, Terengganu, Pahang and Perak during the Northeast monsoon and considerably reduce the flow in Selangor and Klang watersheds during the Southwest monsoon, between 2025 and 2050 (Shaaban et al., 2010). The change in flow has consequences on properties, for example

structural damage due to heavy rainfall, flooding and rainfall-induced landslides (Shahid et al., 2017).

Figure 1 shows the estimated climate change influence on rainfall and temperature until year 2100 (National Hydraulic Research Institute of Malaysia, NAHRIM). The increase in rainfall in the Northern Region/East Sarawak/West Sabah/West Sarawak is indicated, whereas the decrease in rainfall is anticipated in the Central region of Malaysia and East Sabah). Whereas an increase in temperature is projected in East Sabah and West Sarawak).

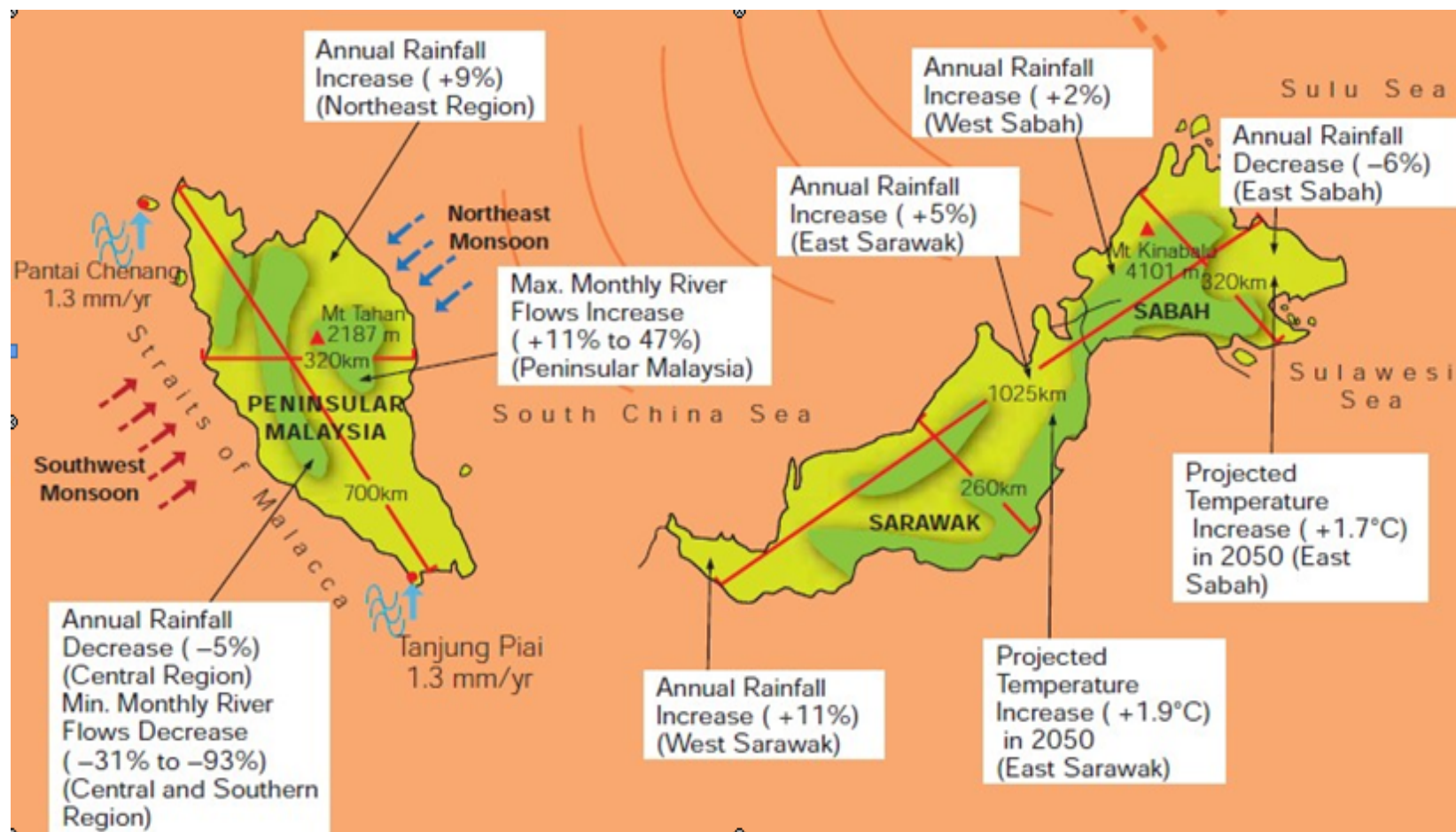


Figure 1: Projected Climate Change in Malaysia

Source: M.S.F, Mohd. National Hydraulic Research Institute of Malaysia (NAHRIM), 2019

2. OCCURANCE OF FLOOD EVENTS IN MALAYSIA

2.1 Flood Background

Floods cannot be avoided in totality, because the amount of precipitation is beyond the human control (Adnan et al., 2016). Malaysia is a country rich in water resources, receiving an abundant amount of rain every year, has an equatorial climate with constant high temperatures and a high relative humidity. The average annual rainfall is 2,400 mm for Peninsular Malaysia, 3,800 mm for Sarawak and 2,600 mm for Sabah with heavier precipitation recorded in the east coast of Peninsular Malaysia and the coastal regions of Sabah and Sarawak. The climate is influenced by the northeast and southwest monsoons. The former, prevailing between November and February, brings heavy rainfall (as much as 600 mm in 24 hours in extreme cases) predominantly to the east coast of Peninsular Malaysia and to Sabah and Sarawak. Rain bearing winds also come with the southwest monsoon from April to September though rainfalls during these periods are generally less than during the northeast monsoon. There are, in addition, two transitional periods between the monsoons (inter monsoon) when convectional thunderstorms are common.

There are 189 river basins throughout Malaysia, including Sabah and Sarawak (89 of the river basins are in peninsula Malaysia, 78 in Sabah and 22 in Sarawak), with the main channels flowing directly to the South China Sea and 85 of them are prone to become recurrent flooding. 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 (Seman, 2017).

Rivers and other water catchment areas offer a variety of functions both for human and for the natural ecosystem. These are essential parts of the natural, economic, and social system of

the flood prone to become recurrent flooding Makmom (2017). Nonetheless, rivers are also viewed as a threat on the occurrence of flood whereby shallow riverbed often overflows. Flood causes damages to the nation and citizens in terms of damage of belongings and loss of economic value. Since 1920, the country has experienced major floods in the years of 1926, 1963, 1965, 1967, 1969, 1971, 1973, 1979, 1983, 1988, 1993, 1998, 2005, 2006, 2007 (Shakirah et al., 2016; Chan, 2012) and most recently massive flood in December 2014 which occurred in Kelantan, Terengganu and Pahang. From 1980 to 2010, a total of 29 flood events have been recorded (Diya et al., 2014). Kedah and Perlis also experienced flood in 2010 and also the recent flood in 2014. Sabah and Sarawak experienced high intensity rainfall in January 2015 caused major flooding across several parts of Sarawak and Sabah affecting around 13,878 people had been evacuated with one teenage girl became the only casualty. The massive flood in 2014 affected more than 200,000 in Malaysia especially in Kelantan, Terengganu and Pahang and sadly 21 people killed. Damages due to flood is estimated at above RM 1 billion, damaging properties and belongings. More recently, Table 2 shows major flood events in Peninsular Malaysia from 2015 to 2016.

Table 2: Flood Events in Malaysia since 2015 to 2016

State	Number of Flood Events	Average daily rain (mm)	Maximum flood duration (hari)	Number of flood victims (Orang)	Estimated loss (RM)	Maximum flood depth (m)
Perlis	19	156	7	458	-	0.5
Kedah	33	200.5	0.63	1,706	12,685,000.00	1.5
Pulau Pinang	20	158	0.21	-	-	1.5
Perak	52	159	10	4,421	6,946,500.00	1.8
Kelantan	49	514	7	319,156	36,394,000.00	7
Terengganu	19	413	7	62,281	18,600,000.00	1.8
Pahang	27	537	6	69,728	13,570,000.00	2.5
Selangor	92	144	2	308	-	1
Melaka	11	148	0.2	96	-	0.6
N.Sembilan	14	101	0.3	-	7,650,000.00	1.2
Johor	8	267	6	1,677	-	0.6
Sabah	13	158.7	7	8,059	122,450,000.00	4
Sarawak	14	192.5	60	388	-	1.5
WP KL	7	87	0.125	-	-	0.6
WP Labuan	3	-	2	-	-	1
Total	381			468,278	218,295,500.00	

Source: (Department of Irrigation and Drainage, 2018)

More recently, the consequences of climate change have been realized through the incidents

of flash flood in Penang, Johor, Terengganu, Pahang and Sabah that resulted in fatal and evacuations to shelters (See Table 3).

Table 3: Major Floods in Malaysia (2017/2018)

Date	Location	Description
November 2017	Penang, Malaysia	In Penang, 3000 residents were evacuated. The state was hit by strong wind and torrential rain that lasted for a few hours, due to a tropical cyclone (Reuters, 2017).
Jan 2018	Malaysia	The states of Johor, Terengganu, Pahang and Sabah experienced heavy ad consequently flood due to the annual northeast monsoon. Twelve thousand people were left homeless and killed two people in Pahang (The Straits Times, 2018).

Malaysia experiences floods and droughts that affect certain areas in the country due to climate changes (MNRE, 2015). Flood issues are yearly affairs that are worrying comparative to droughts (MNRE, 2015). It is crucial to see whether floods and droughts management issue has been incorporated in the National Adaptation Plan (NAP) and being implemented properly in the fields. WACDEP in South East Asia is expected to facilitate the countries in South East Asia to improve climate resilience with floods and droughts management as the main focus.

Flood mitigation plans are considered very important; thus, these are re-evaluated to provide more effective responses. Planning is crucial for mitigation of flood and placed on the interface between river drainage capacities, sea level rise and stronger storm surges as well as integrity of natural ecosystems as Malaysia has a long coastline the government has provided importance in flood mitigation programmes in the yearly budget. During the Tenth Malaysia Plan (2011–2015), 194 flood mitigation projects were implemented and 34 local scale flood hazard maps were developed to facilitate disaster prevention implementation. Despite these cumulative efforts, the country is still prone to extreme weather events. In the extreme flood of 2014, 25 lives were lost, half a million people were affected and damage to public infrastructure amounted to RM2.9 billion.

The average cost borne by the Government to mitigate floods over the past 40 years has risen from about RM3 million per year during the Second Malaysia Plan period (1971-1975) to RM1.3 billion per year during the Tenth Malaysia Plan period (2011-2015). As part of the efforts to implement integrated flood management (IFM), integrated flood forecasting and early warning systems (EWS) incorporating public participation has been developed for several major river basins. The EWS system must be extended to all river basins, taking into account the role of forests in IFM. Further enhancement of the systems based on technology transfer, specifically the weather pattern and flood prediction components is necessary to improve the accuracy, lead time and effectiveness of EWS, Training programmes in IFM, including EWS must be conducted in order to cater the additional human resource needs for IFM.

River flooding is perceived as resulting from heavy rainfall that leads to large concentration of runoff that exceeds the capacity of the river Makmom (2017). Over the years, massive development within the river catchment area resulted to runoff and reduced the capacity of water catchment by the river (DeWalle et al., 2000; Emerson et al., 2005; Claessens et al., 2006; Goff and Gentry, 2006; Cuo et al., 2008; Bhaskar et al., 2016; Jeremy et al., 2017); and resulted higher frequency of flood. Flash flood in urban areas is perceived to be the most critical type of flood (surpassing the monsoon flood) since the mid 1990's.

The occurrence of frequent flash flood is viewed from perspective of flood frequency and extent, social-economic problems, public dissensions, media reporting and the government's increased allocation in flood mitigation. However, cause of flood in the coastal areas are accredited to high tides and sporadically heightened by heavy rains or strong wind. In the last decade, there has been a great concern increase of other flood-related disasters such as debris flood flow, mud flow and landslides in mountain streams and hill slopes. . Urban flooding is

also due to failure in systematic drainage system, pollution, management of urbanization, environment factor, changes in and dam break (Kong et al., 2010)

2.1 Policy

The following section discusses the policies in relevance to water and climate change in Malaysia. This includes the National Policy on Environment, National Water Resources Policy and National Policy on Climate Change.

2.1.1 National Policy on Environment

The National Policy on the Environment has been established for continuous economic, social and cultural progress and enhancement of quality of life through environmentally sound and sustainable development (DOE, 2018).

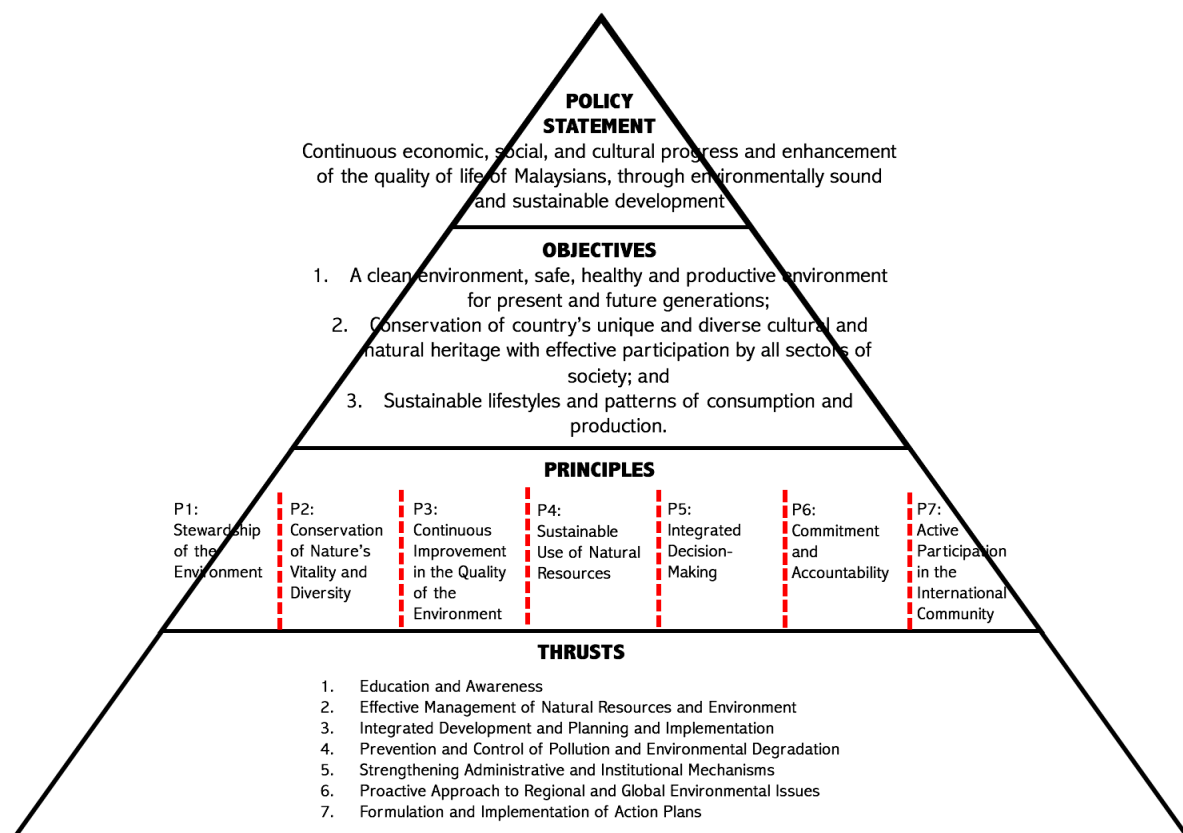


Figure 2: National Policy on Environment

Source: (Department of Environment, 2018)

2.1.2 National Water Resources Policy

The National Water Resources Policy (NWRP) launched in March 2012 is intended to act strategically towards ensuring that the demand for water is met in terms of quantity and quality for both man and nature. It provides clear directions and strategies in water resources management to ensure water security as well as sustainability. The four focus areas are water resources security, water resources sustainability, partnership, and capacity building and awareness (MNRE (2015)). The policy has adopted the Integrated Water Resources Management (IWRM) (Ministry of Natural Resources and Environment Malaysia, 2012)

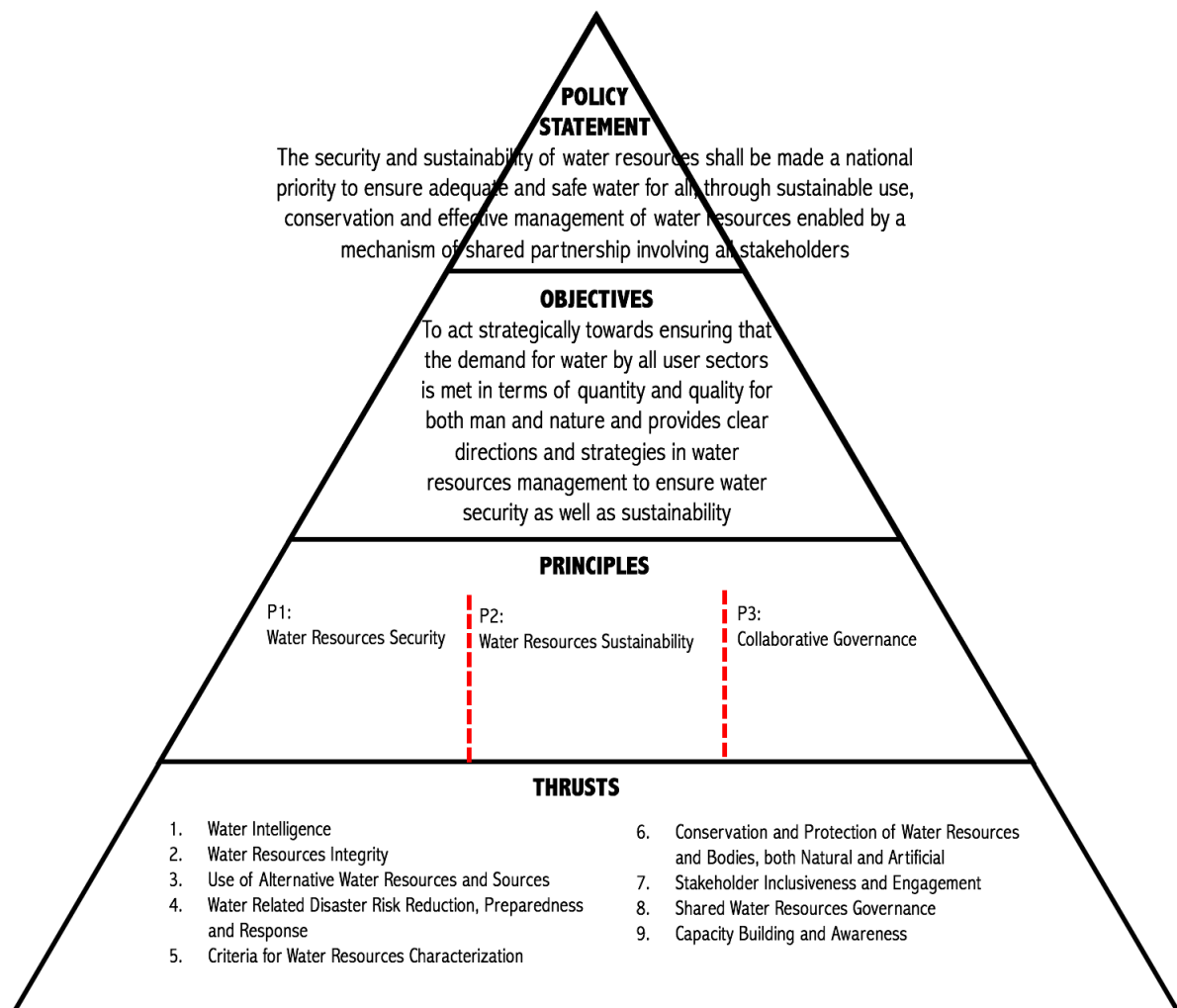


Figure 3: National Water Resources Policy

Source: (Ministry of Natural Resources and Environment Malaysia, 2012)

2.1.3 National Policy on Climate Change

The National Climate Change Council was established in September 2009.

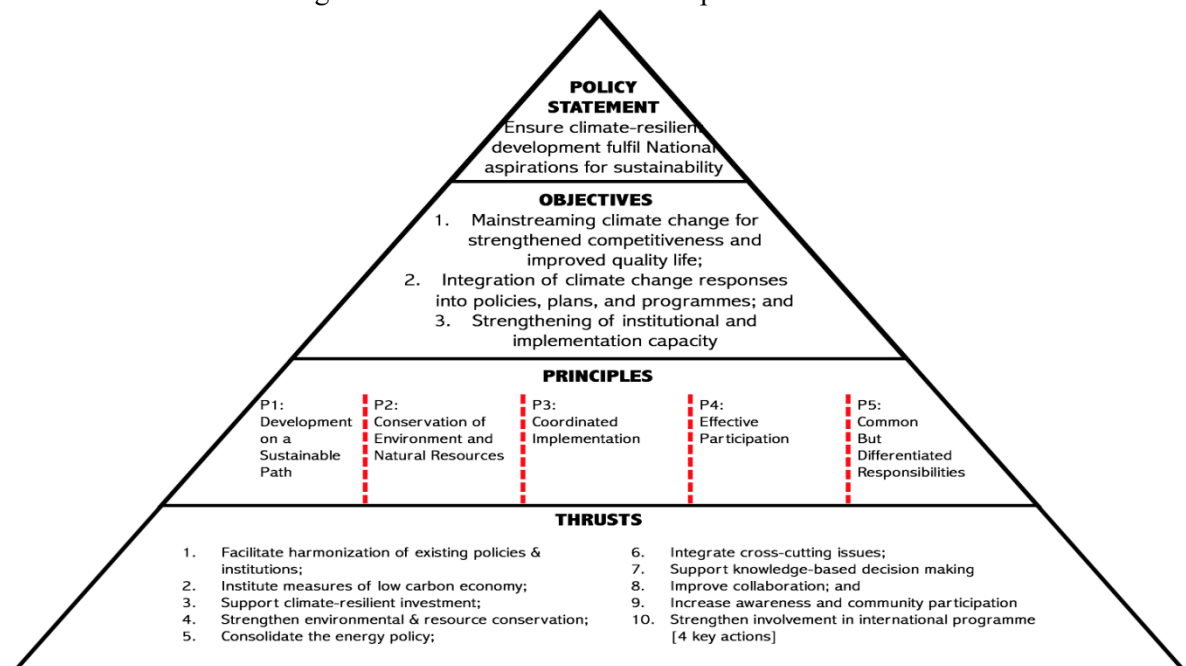


Figure 4: National Policy on Climate Change

Source: Ministry of Natural Resources and Environment Malaysia, 2009

In terms of policy pertaining to flood in comparison to Malaysia, it is apparent the United Kingdom (UK) has specific flood policies, unlike Malaysia whereby the policies are general. The UK has broader focus on the reduction of flood by specifying the roles of each of the relevant authorities in handling the flood, while Malaysia focuses on the integrated disaster management system per se. On the other hand, Malaysia is also still without a legalistic framework to tackle climate change. However, the Minister of Energy, Science, Technology, Environment and Climate Change has indicated that Malaysia will start to draft a Climate Change Act and is expected to be tabled in parliament within three year time (Sim, 2018)

2.2 Sendai Framework

The Sendai Framework for Disaster Risk Reduction (2015-2030) provides comprehensive guidelines for disaster management where it is relevant to this paper. It is the most recent

guide to international disaster reduction (Kure et al., 2016). It was endorsed by the United Nations (UN) General Assembly and adopted by UN member states following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR). Overall, the goal of the Sendai Framework is to mitigate new and reduce existing disaster risks through integrated and inclusive economic, social, health, cultural, educational, environmental, legal, technological, and political aspects (UNISDR, 2015). It is, also, to prevent and reduce hazard exposure and vulnerability to disasters besides enhancing the preparedness for response and recovery (Kure et al., 2016). The Sendai Framework applies to risks of small-scale and large-scale, frequent and infrequent, and sudden and slow-onset disasters (Wahlstrom, 2015).

There are four priority areas to focus attention within and across sectors, by States, at local, national, regional, and global levels as pointed out in the Sendai Framework (UNISDR, 2015) (see Table 3). The first two priorities include the need to understand the disaster risk and to strengthen disaster risk governance by managing the disaster risk. This is followed by priority 3 which includes investing in disaster risk reduction for resilience, and then priority 4, enhancing disaster preparedness for effective response and to ‘Build Back Better’ in recovery, rehabilitation, and reconstruction (UNISDR, 2015).

3. CATEGORISE PROJECTS BASED ON GAP ANALYSIS AND IDENTIFY PRIORITY PROJECTS

In terms of methodology, two existing frameworks each developed by Stephen Covey (see Figure 5) and Larson and Gray (2011) (see Figure 6) were modified to propose a new framework (See Figure 7). Figure 5 shows the Steven Covey Matrix. Based on this matrix the identification of projects on development of national water and climate development programme can be done using the Stephen Covey’s Time Management Matrix. The figure

shows that Priority 1 (Urgent and Important) includes projects that need to be done first. Next, Priority 2 (Not urgent but Important) implies that the schedule time to continue the progress on projects that are not a priority but important to the business equally. Priority 3 indicates (Urgent but Not important). Finally, Priority 4 implies (Not urgent and Not important).


Stephen	Covey's	Time	Management	Matrix
	URGENT IMPORTANT deadlines exams “real” crises / emergencies last-minute preparations meaningful appointments MANAGE			 NOT URGENT IMPORTANT planning problem prevention self-development healthy, quality relaxation FOCUS
	URGENT NOT IMPORTANT some calls, emails reporting somebody else's problems and needs shallow relationships some meetings AVOID			NOT URGENT NOT IMPORTANT social media watching TV nonsense movies gossiping shopping LIMIT

Figure 5: Steven Coveys Time Management Matrix

Source: Sid Savara, 2018

Figure 6 shows the level of importance in a particular project ranging from low to high priority projects. Understanding of such is crucial in prioritizing the best and most suitable projects to be conducted.

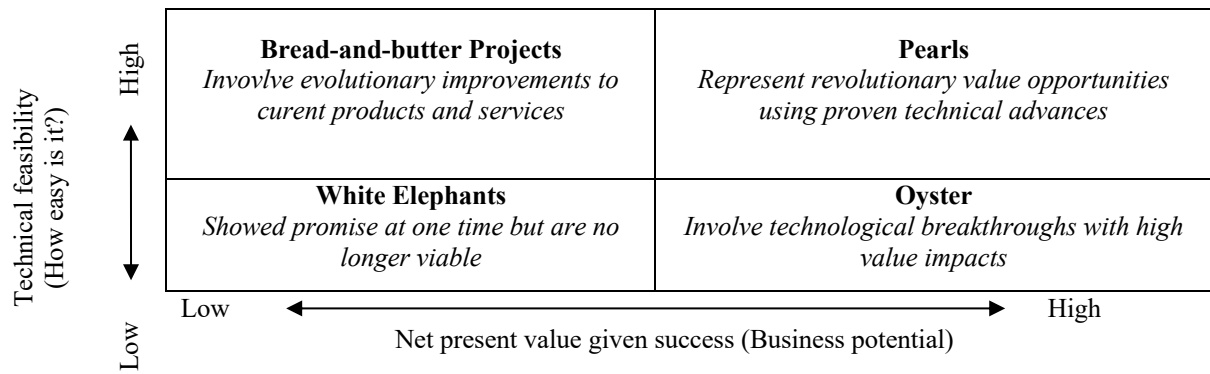


Figure 6: The level of importance in a particular project

Source: Larson & Gray, (2011)

The proposed model (see Figure 7) has included detailed information to prompt respondents (stakeholders) on the priority projects. This includes the inclusion of (Somewhat important) in (value column) as well Moderate in the (Impact column). Besides, the urgency of the project was incorporated (urgent (Immediate term), somewhat urgent (medium goal) and not urgent) (future) to obtain detailed idea about the proposed projects.

Value	Immediate Term	Medium Goal	Future Vision	Impact
Important	Crisis and important deadlines MANAGE	Pathway to future vision PLAN	Long-term strategy and development FOCUS	High
Somewhat Important	Potential opportunities EVALUATE	Good to have MONITOR	Added value opportunities KEEP IN VIEW	Moderate
Not Important	Time pressured distractions IGNORE / AVOID	Potential distractions REDUCE	Activities of little value LIMIT	Low
	Urgent	Somewhat Urgent	Not Urgent	

Figure 7: Project Prioritization Framework

Source: All right reserved to Zelina Ibrahim; modified from Larson & Gray, (2011) and Stephen Covey

The stakeholders from (Government agencies/Private sector and Non-Governmental Organizations (NGOs) were presented with all the (59) items in the four priorities of the Sendai Framework based on the gap analysis performed in Makmom (2017). The gap analysis was conducted with focus on Flood Disaster Management using Sendai Framework for Disaster Risk Reduction, 2015-2030 (See Appendix 1).

The stakeholder workshop on development of National WACDEP conducted on 13 November 2018 participated by 32 participants.

The stakeholder constitutes of the following:

Representatives from Government Agencies: Ministry of Finance, Department of Irrigation and Drainage (DID), Forestry Department of Peninsular Malaysia (JPSM), Ministry of Energy, Science, Technology, Environment and Climate Change (Mestec), Selangor Waters Management Agency, Kuching Water Board, Malaysian Meteorological Department, Department of Engineering Universiti of Malaya, Academy of Sciences Malaysia, National Disaster Management Agency (NADMA), Ministry of Health;

Representatives from NGOs: World Wildlife Fund for Nature (WWF), Centre for Environment, Technology and Development, Malaysia (CETDEM), Global Environment Centre (GEC)

Private Agencies: Indah Water Consortium SDN BHD and RPM Engineers SDN BHD

Several steps were adhered to facilitate the ranking of the priority projects with focus on flood:

The respondents were grouped into four groups where in each group comprises participants from government agencies, private institutions and NGOs.

They were asked to choose and categorise the 59 items in the stakeholder workshop using the

cards given on an A3 paper based on the proposed framework (see Figure 3 above).

Later, coding was used for each item to extract the item numbers by its categories. For example, the first item in priority 1 was coded as (1.1).

Subsequently, all the findings from the four groups by the categories in Figure 1 were gathered and written on the white board to check for double counting. The respondents from different groups had to choose the same items (see Table 3; qualitative analysis result).

4. ANALYSIS

In this section both the qualitative and quantitative analysis was carried out based on the findings from the stakeholder workshop.

4.1 Qualitative ranking analysis

Table 4 shows the qualitative analysis result. The numbers bolded represents the number of counts. For example; for important and short term; item 1.3 has two counts, item 1.15 has three counts etc. These counts show the higher degree of importance/priority for those items.

Table 4: Qualitative ranking

Important	<p>1.12 1.3 2 1.10 1.4 1.12 1.2 2 1.8 3 1.7</p> <p>1.15 3 1.13 1.9 1.11</p> <p>2.1 2 2.2 2.6 2.7 2.3 2 2.11 2 2.4 2</p> <p>3.1 2 3.6 3.9 3.16 3.11 3.12 3.13 3.15 3.17</p> <p>4.1 4.4 4.6 2 4.2 4.5 4.8 2 4.10 4.13</p>	<p>1.1 1.2 1.5 1.6 1.12 1.4 1.13 2</p> <p>2.2 2.5 2.9 2 2.1 2.4 2.6</p> <p>3.6 2 3.7 2 3.1 2 3.15 2 3.12</p> <p>3.14 2</p> <p>4.16 2 4.2 4.1 4.3 4.4 4.7 4.8</p> <p>4.10 4.13</p>	<p>1.5 1.3 1.10</p> <p>2.1 2.5 2.9</p> <p>3.2 3.4 3.5 3.12 3.13 2</p> <p>4.3 4.15 4.9 4.5 4.12</p>
Somewhat Important	<p>1.7 1.1 2 1.9 1.4</p> <p>2.11 2.3 2.8 2 2.6 2.7</p> <p>3.7 3.11 3.5 3.6 3.17 3.15 3.10 2</p> <p>4.1 4.2 2 4.3 4.7 4.8 4.14 4.6 2 4.11 2</p>	<p>1.1 1.5 1.4 2 1.7 1.10 1.8 1.9 1.12</p> <p>1.14 3</p> <p>2.7 2.8 2 2.2 2.6</p> <p>3.2 3.3 3 3.5 3.8 1.2 3.7 3.9 2</p> <p>3.10 3.11 3.16 3.17</p> <p>4.9 4.15 2 4.7</p>	<p>1.2 1.5 1.3 1.6 1.7 1.8 1.11 3</p> <p>1.12 1.13 1.15</p> <p>2.4 2.5 2.7 2.9 2.10 2 2.11</p> <p>3.2 3.4 3.7 3.8 3.10 3.11 3.16</p> <p>4.4 4.5 4.14 2 4.15 4.16</p>
Not Important	<p>4.12 2 4.16</p>	<p>1.6</p> <p>2.10 2.5</p> <p>3.13 3.4</p> <p>4.1 4.7 4.9 4.14 4.5</p>	<p>1.9</p> <p>2.10</p> <p>3.2 3.3 3.4 3.5 3.14 2 3.16</p> <p>4.4 4.10 4.11 4.12</p>
	Short-term	Medium	Long-term

4.2 Quantitative ranking analysis

The quantitative analysis was carried out using Microsoft Excel where all the information (in Table 4) was converted to excel sheet. For this purpose, a scale of Not important: 1, Somewhat important: 3, important: 5 and Short term :1, Medium term : 3, Long term: 5 was developed to determine the top priorities in Excel worksheet. The total score for each item was determined by multiplying the level of importance score with the expected time/term based on the matrix (see Table 5) and the number of counts for each items. The result is presented in graph form (See Figures 1, 2, 3, 4 and 5). The specific details of the top ranking items are presented in Table 4.

Table 5: Baseline scoring for items in four priorities in Sendai Framework

Important (5)	5	15	25
Somewhat Important (3)	3	9	15
Not Important (1)	1	3	5
	Short-term (1)	Medium (3)	Long-term (5)

Note: Number of counts may increase the total scoring

Detailed example of calculations:

Sendai No.	Priorities
2.05	PRIORITY 2 MEDIUM AND IMPORTANT (MI)
2.05	PRIORITY 2 (LTI) LONG-TERM AND IMPORTANT
2.05	PRIORITY 2 LONG AND SOMEWHAT IMPORTANT (LSI)
2.05	PRIORITY 2 MEDIUM AND NOT IMPORTANT (MNI)

Hence, based on Table 5 the accumulated scoring across the levels of (indicator and period of time) is $(15+25+15+3) = 58$

Table 6: Accumulated total scoring for items four groups by for one item in Sendai Framework without counts (example based on item (1 priority 1))

Important (5)		15	25
Somewhat Important (3)			15
Not Important (1)		3	
	Short-term (1)	Medium (3)	Long-term (5)

Note: Number of counts may increase the total scoring

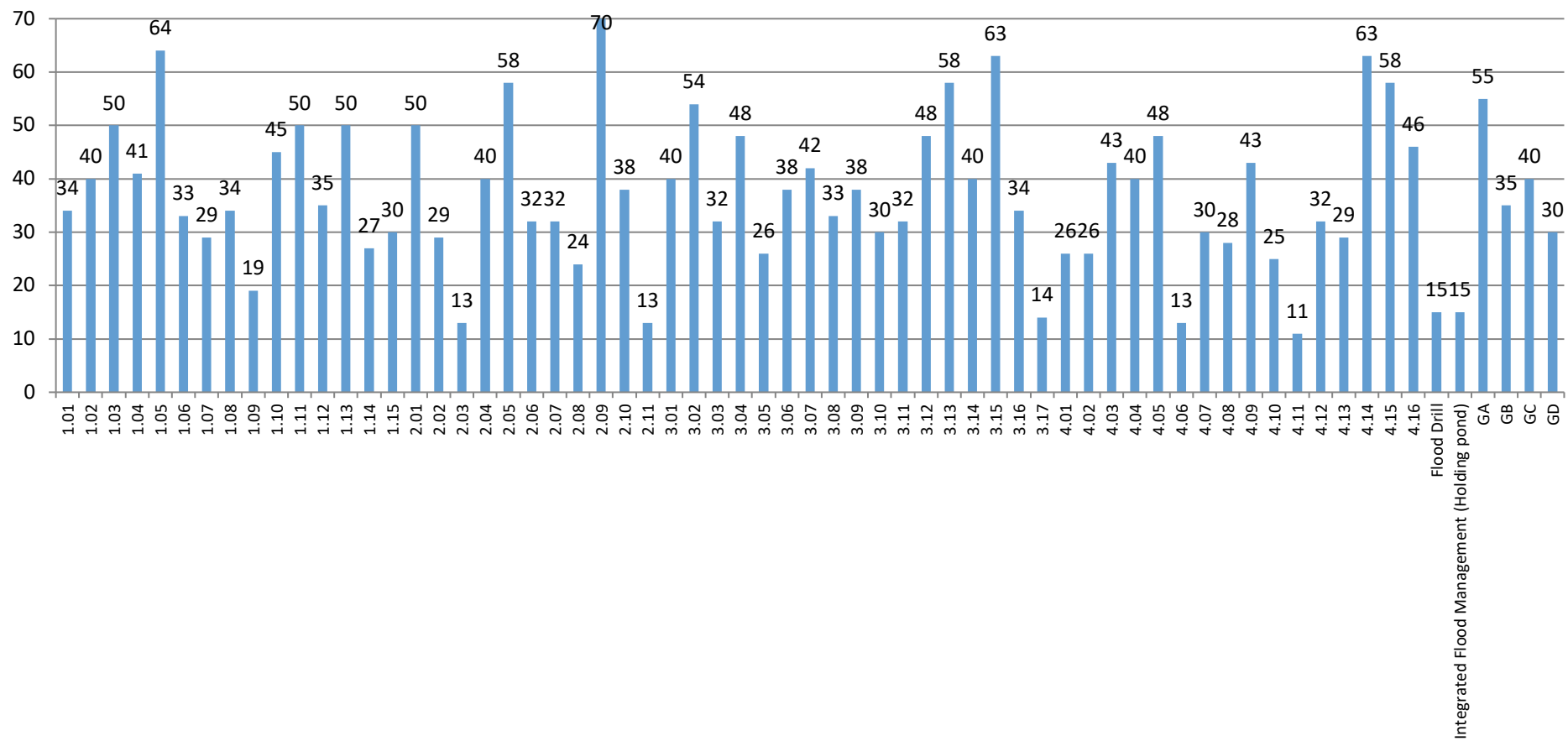


Figure 8: Overall

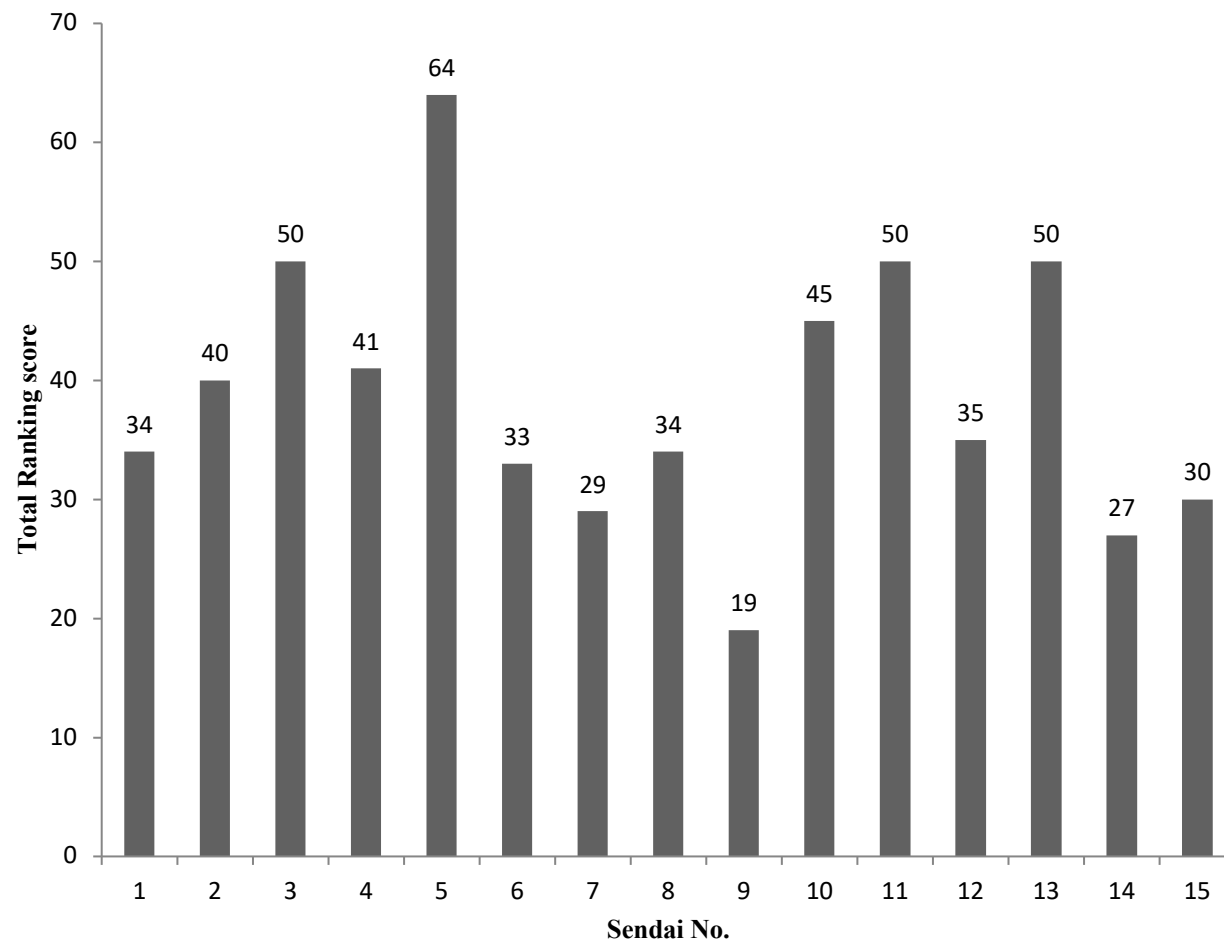


Figure 9: Priority 1

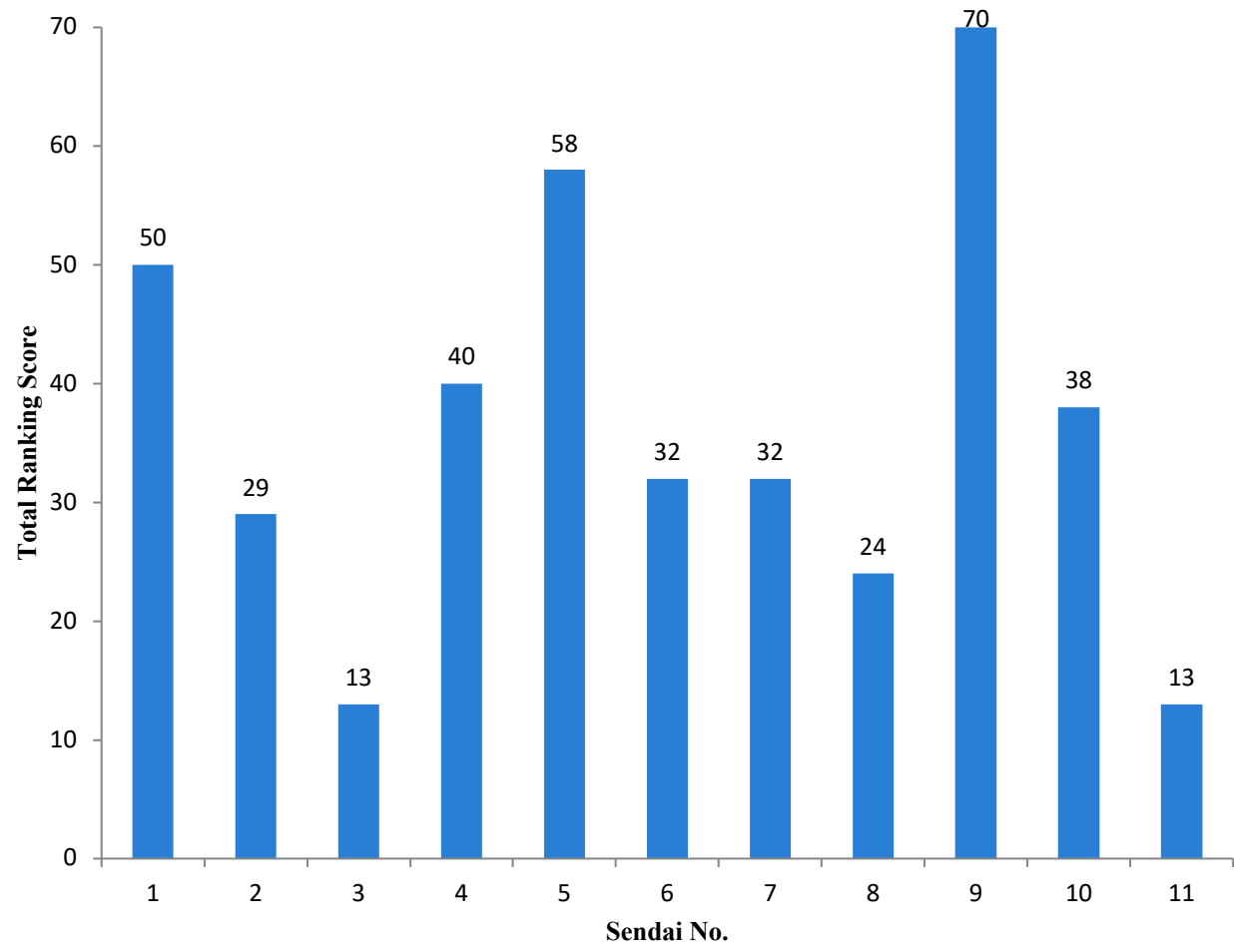


Figure 10: Priority 2

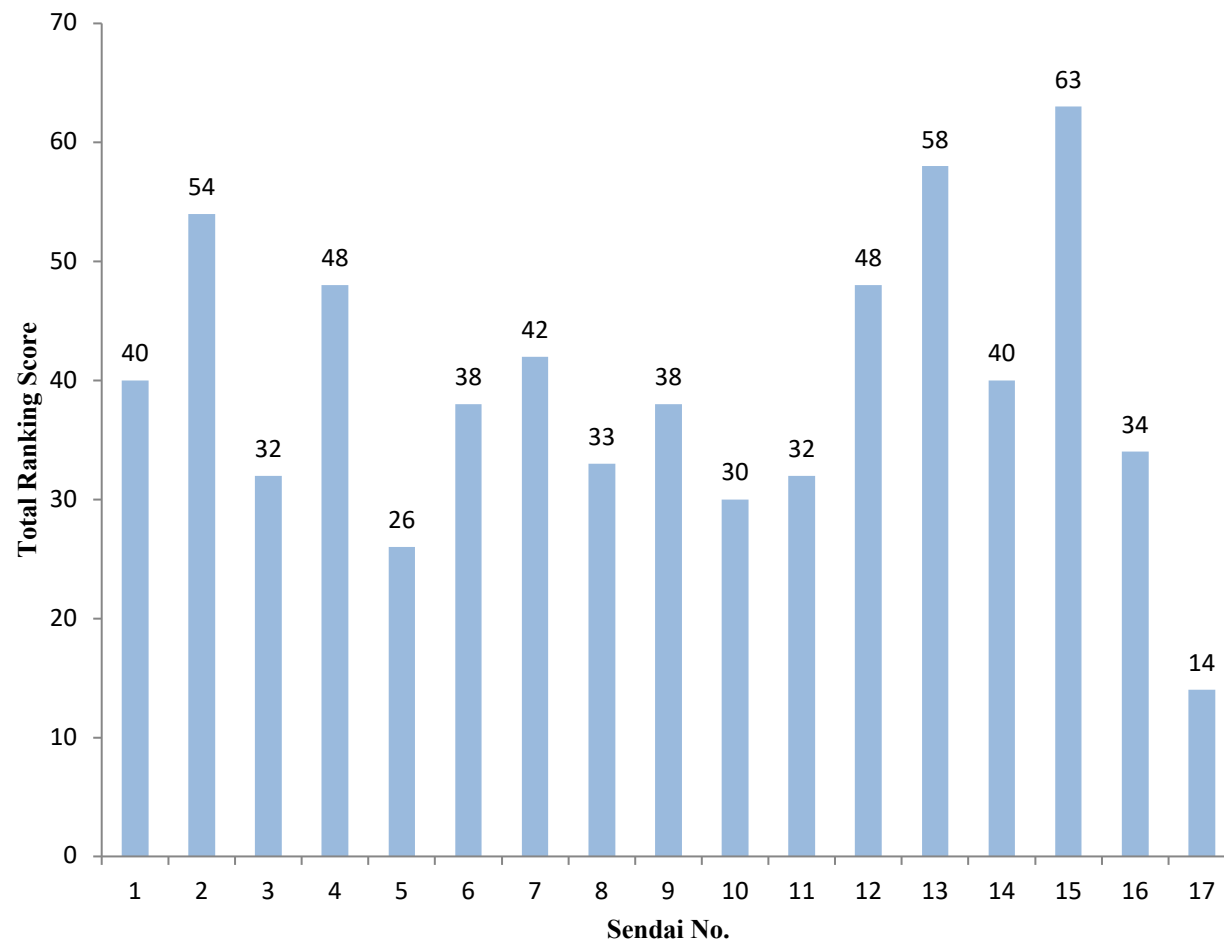


Figure 11: Priority 3

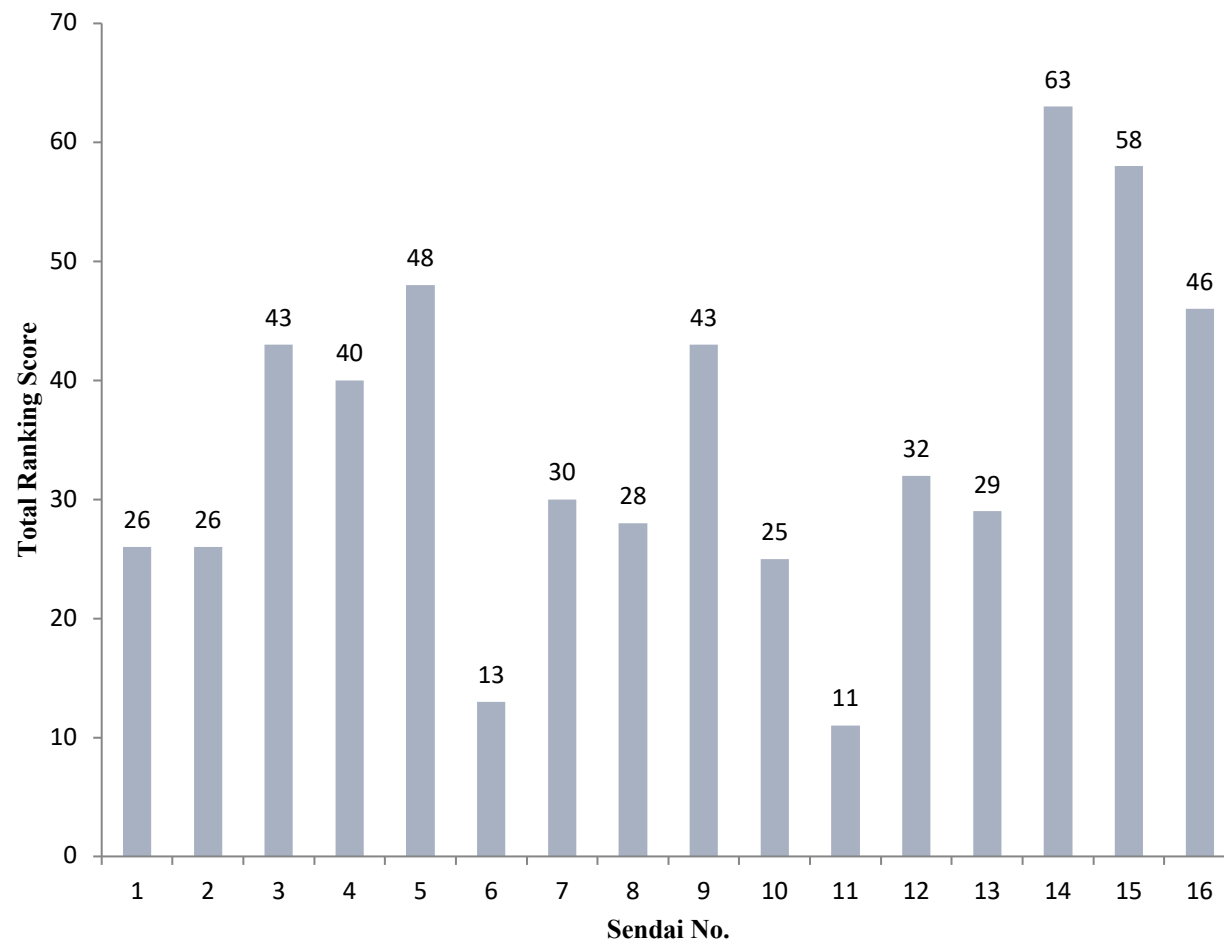


Figure 12: Priority 4

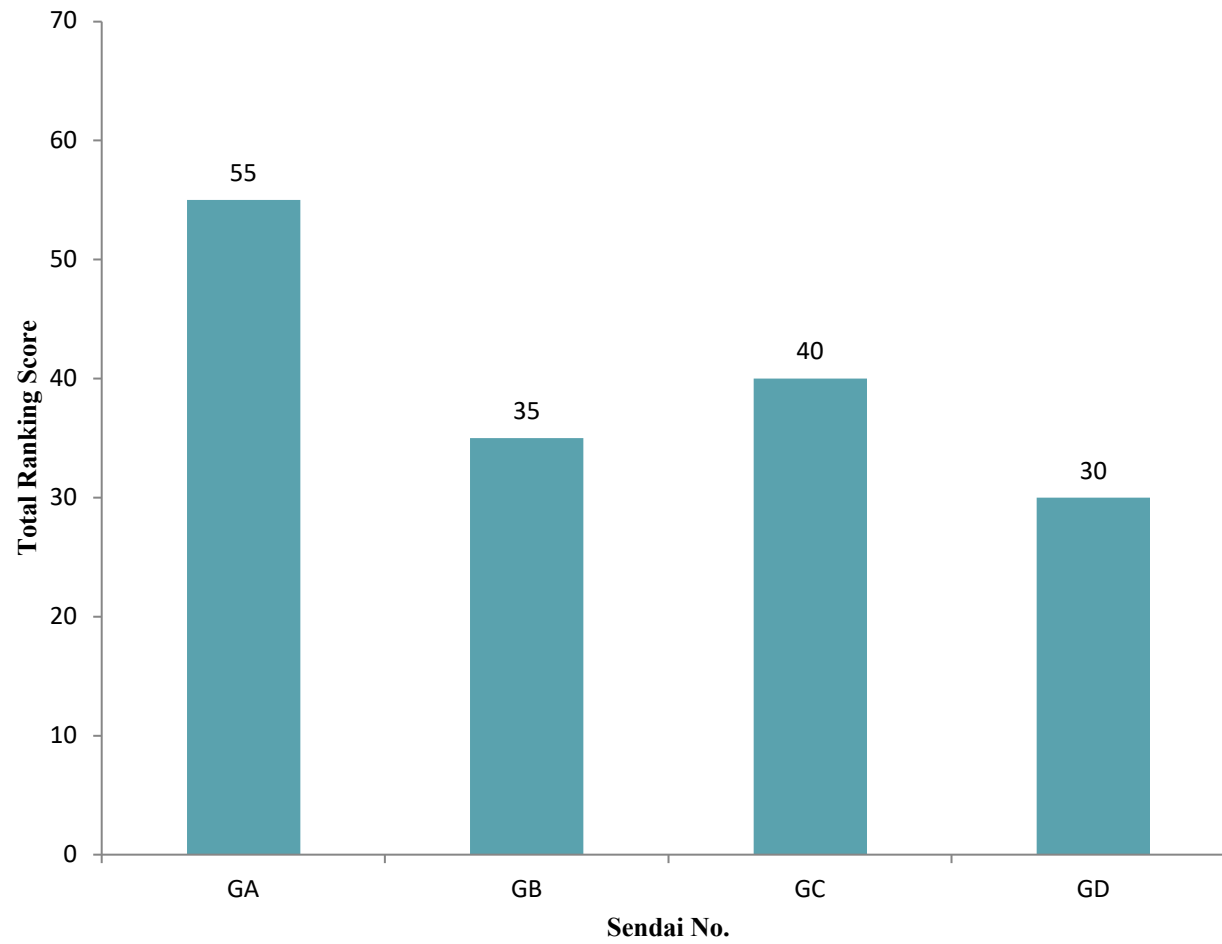


Figure 13: Role of Stakeholder

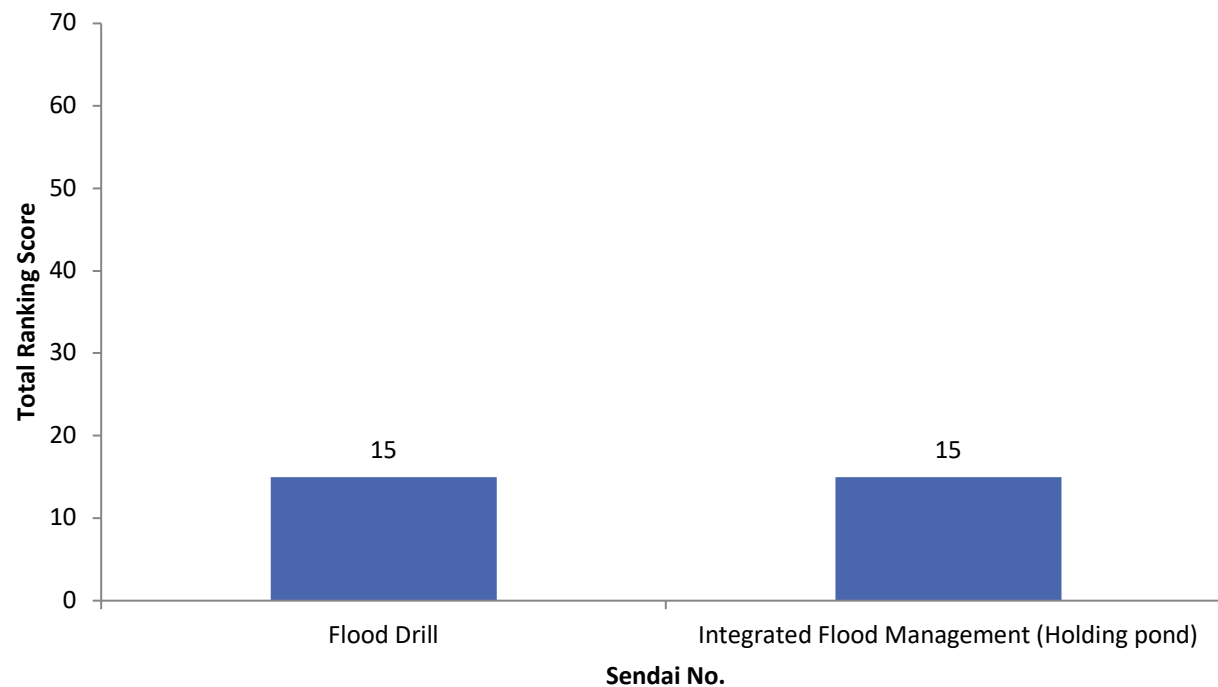


Figure 14: Additional Suggestions

Table 3 shows the top six priorities for each of the priorities in the Sendai Framework as well role of stakeholders and additional suggestions chosen by the stakeholders. The understanding of such priorities are important in understand the priorities of projects for the development of National Water and Climate Development Programme.

Table 7: Overall Top 5 Items in Priorities for all Priorities in Sendai Framework

Sendai Priority	Ranking Score	Ranking	Item	Description
2 (Strengthening disaster risk governance to manage disaster risk)	70	1	9	To encourage parliamentarians to support the implementation of disaster risk reduction by developing new or amending relevant legislation and setting budget allocations
1 (Understanding Disaster Risk)	64	2	5	To make non-sensitive hazard-exposure, vulnerability, risk, disaster and loss-disaggregated information freely available and accessible, as appropriate
3 (Investing in disaster risk reduction for resilience)	63	3	15	To strengthen the protection of livelihoods and productive assets, including livestock, working animals, tools and seeds;
4 (Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation, and reconstruction)	63		14	To establish a mechanism of case registry and a database of mortality caused by disaster in order to improve the prevention of morbidity and mortality
2 (Strengthening disaster risk governance to manage disaster risk)	58	4	5	To develop and strengthen, as appropriate, mechanisms to follow up, periodically assess and publicly report on progress on national and local plans; and promote public scrutiny and encourage institutional debates, including by parliamentarians and other relevant officials, on progress reports of local and national plans for disaster risk reduction
3 (Investing in disaster risk reduction for resilience)	58		13	To strengthen the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction
4 (Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation, and reconstruction)	58		15	To enhance recovery schemes to provide psychosocial support and mental health services for all people in need
Role of stakeholders	55	5	A	Civil society, volunteers, organized voluntary work organizations and community-based organizations to participate, in collaboration with public institutions, to, inter alia, provide specific knowledge and pragmatic guidance in the context of the development and implementation of normative frameworks, standards and plans for disaster risk reduction; engage in the implementation of local, national, regional and global plans and strategies; contribute to and support public awareness, a culture of prevention and education on disaster risk; and advocate for resilient communities and an inclusive and all-of-society disaster risk management that strengthen synergies across groups, as appropriate.
3 (Investing in disaster risk reduction for resilience)	54	6	2	To promote mechanisms for disaster risk transfer and insurance, risk-sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on Governments and societies, in urban and rural areas

5. LOGICAL FRAMEWORK (LOGFRAME) ANALYSIS OF PROJECTS

Table 8 shows an example of the detailed logframe to ascertain information on the projects to be carried out. This includes addressing the goal of the project, outcomes, and the expected findings from the Project as well the activities to be carried out to achieve the objective of the project.

Table 8: Example of Logframe

IFRC Logical Framework (logframe) – Definition of Terms			
OBJECTIVES (What we want to achieve)	INDICATORS (How to measure change)	MEANS OF VERIFICATION (Where / how to get information)	ASSUMPTIONS (What else to be aware of)
Goal The long-term results that an intervention seeks to achieve, which may be contributed to by factors outside the intervention.	Impact Indicators Quantitative and/or qualitative criteria that provide a simple and reliable means to measure achievement or reflect changes connected to the goal.	How the information on the indicator will be collected (<i>can include who will collect it and how often</i>).	External conditions necessary if the Goal is to contribute to the next level of intervention.
Outcomes The primary result(s) that an intervention seeks to achieve, most commonly in terms of the knowledge, attitudes or practices of the target group.	Outcome Indicators As above, connected to the stated outcome.	As above	External conditions not under the direct control of the intervention necessary if the outcome is to contribute to reaching intervention goal.
Outputs The tangible products, goods and services and other immediate results that lead to the achievement of outcomes.	Output Indicators As above, connected to the stated outputs.	As above	External factors not under the direct control of the intervention which could restrict the outputs leading to the outcome.
Activities The collection of tasks to be carried out in order to achieve the outputs.	Process Indicators As above, connected to the stated activities.	As above	External factors not under the direct control of the intervention which could restrict progress of activities.

Source: Centre for International Development and Training University of Wolverhampton, 2018.

5.1 Findings on Project log frame for Malaysia

Table 9 shows the details of the project proposed by the stakeholders where they were grouped into groups with a mixture of representatives from government agencies, NGOs, and private agencies. The outcomes of the projects proposed include Greater awareness to the environment, effective integrated flood management and improvements in existing workforce and voluntary workers in disaster response. The means of verification include secondary data (reports from relevant agencies and workshop report and surveys. The detailed list of the project activities summarized from this table is shown in Table 10.

Table 9: Proposed projects during the stakeholder's workshop

Groups	Items	PROJECT SUMMARY	INDICATORS	MEANS OF VERIFICATION	RISKS / ASSUMPTIONS
Group 1	GOAL 1.1	To promote the collection, analysis, management and used of relevant data and practical information and ensure its dissemination, taking into account the need of different categories of users, as appropriate,	Volume of access of information by sectors about National IWRM Information Repository System; 1. Number of hit by public to the webpage 2. Revamp the existing webpage 3. Number of feedbacks 4. User friendly Appropriate usage of water by sectors;	Numbers of hit – Increase. Weekly/Monthly assessment on the numbers of hits. Undertake questionnaire on IWRM Information Repository System.	Inadequate data and not updated, invalidated Restricted access
	OUTCOMES	Greater awareness by the different sectors by; Agriculture Industry Domestic Environment	As above, connected to the stated outcomes.	Household and sectoral survey	
	OUTPUTS	Usage water efficiently by the above sectors.	As above, connected to the stated outputs.	Household and sectoral survey	
	ACTIVITIES	Undertake 8 workshops for each sector on IWRM. National, Public, Sectoral, (top to bottom).	As above, connected to the stated activities. Awareness at all level up to 50%.	Workshop report	People continue to have sufficient time to
Group 2	GOAL 3.13	to promote, as appropriate, the integration of disaster risk reduction considerations and measures in financial and fiscal instruments			
	OUTCOMES	introducing of effective integrated flood mitigation programme	Number of initiative	report	resources available
	OUTPUTS	Reduce the flood incidence; Establish a integrated flood mitigation model	Number of flood	report from relevant agencies	resources available
	ACTIVITIES	initiate pilot project to demonstrate the IFM	success of model (reduction in number of flood incidence	report	resources available
Group 3	GOAL 2.1	Disaster risk reduction is mainstreamed and integrated within and across all sectors	Impact indicators		
	OUTCOMES	Holistic and strengthened approach in disaster management mechanism	Outcome indicators Aspects of disaster		
	OUTPUTS	Framework of laws, regulations and policies developed	Output indicators		
	ACTIVITIES	Conduct stakeholders consultation Review / assess gaps in existing laws, regulations and policies related to disaster risk reduction	Process indicator		

	GOAL 4.6	To improve existing workforce and voluntary workers in disaster response			
	OUTCOMES	Outcomes The capacity of existing workforce and voluntary workers in disaster response is improved	% of existing workforce and voluntary workers are trained	No of attendees	Full participation
	OUTPUTS	Outputs Sops for disaster response are developed and tested by agencies and social organisations Personnel and voluntary workers are well trained to apply the SOPs	Output indicators SOPs endorsed by relevant authorities No of participating agencies and social organisations with trained personnel and workers	Standard Operating Procedure (SOP)s Attendance list	Relevant authorities approve the Sops Full participation
	ACTIVITIES	Activities Organise consultation workshop to gather inputs from relevant agencies and organisations to develop the disaster response Sops Organise training programme on technical and logistics aspects in disaster response Provide hands-on training to acquire experience for selected personnel and voluntary workers via attachment programmes with neighbouring countries in the region with extreme flood events	Process indicator # of workshops organized and # of agencies that participated # of training sessions held # of trained participants who have gained hands-on experience	Training/workshop reports	People continue to have sufficient time to attend trainings Availability of sufficient budget Willingness of partner countries to implement hands on training program
	COST	RM1.5 million for 1 year			
Group 4	GOAL 1.13	To promote national strategies to strengthen public education and awareness in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilization, taking into account specific audiences and their needs;	Establishment of 1 national strategy that covers from federal to local levels.	National strategy	Risk: National strategy not being adopted by local level
	OUTCOMES	Paradigm shift form a laissez-faire to a group of people that are more concerns on the environment	Changes in human behaviour	National survey	Risk: Public acceptance
	OUTPUTS	School curriculum and education module since kindergarten Module input for media By end of MP11	2 modules and pilot project implementation	Survey	Availability of resources (i.e. financial, human capacity)
	ACTIVITIES	More inter-agencies and inter- ministerial communication and complementing each other Engaging with local levels (State and all its instrument) Identify and review existing public education program Holistic education programs and modules from young generation	KATS to supervise the development of inter-agencies collaboration (MOE, MCMC) How many engagement and at which level DID to identify and review existing public education program Development of education modules	Workshop and stakeholder engagement 10% engagement at local level 1 review report 2 education modules	KATS lead and includes in their KPI Secure budget for implementation Risk: Objection at local levels
	GOAL 2.4	To promote national strategies to strengthen public education and awareness in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilization, taking into account specific audiences and their needs;			
	GOAL 3.1	To allocate the necessary resources, including finance and logistics, as appropriate, at all levels of administration for the development and the implementation of disaster risk reduction strategies, policies, plans, laws and regulations in all relevant sectors;			

Table 10 summarizes the list of potential projects where it is aligned with the items in the Sendai Framework for the development of national water and climate change. The findings are useful in planning for projects particularly to obtain funds to initiate the projects.

Table 10: Proposed projects during the stakeholder's workshop

Items	Sendai Framework	Projects
3.13	To promote, as appropriate, the integration of disaster risk reduction considerations and measures in financial and fiscal instruments	1. Effective integrated flood mitigation programme 2. Initiate pilot project to demonstrate the Integrated Flood Management
2.1	Disaster risk reduction is mainstreamed and integrated within and across all sectors	3. Organise consultation workshop to gather inputs from relevant agencies and organizations to develop the flood disaster response SOPs 4. Review / assess gaps in existing laws, regulations and policies related to disaster risk reduction
4.6	To improve existing workforce and voluntary workers in disaster response	5. Organise training programme on technical and logistics aspects in flood disaster response 6. Provide hands-on training to acquire experience for selected personnel and voluntary workers via attachment programmes with neighboring countries in the region with extreme flood events
1.13	To promote national strategies to strengthen public education and awareness in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilization, taking into account specific audiences and their needs;	7. School curriculum and education module since kindergarten 8. Module input for media
2.4	To promote national strategies to strengthen public education and awareness in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilization, taking into account specific audiences and their needs;	9. Strengthen public education and awareness in disaster risk reduction

5.2 Benchmarking Flood and coastal changes priorities in UK

Table 11 shows that priority areas pertaining to flood and coastal changes in United Kingdom (UK) by its respective states. In general, the priority that has not been identified in Malaysian potential projects include risks to agriculture and wildlife, risks of land management practices, risks to infrastructure and risk to business sites.

Table 11: Flood and coastal changes focus in UK and Malaysia based on Sendai Framework

Items	Sendai Framework	Priorities	States in UK		
		UK	SCOTLAND	WALES	NORTHERN ISLAND
2.1	Disaster risk reduction is mainstreamed and integrated within and across all sectors	1. Risks to agriculture and wildlife from water scarcity and flooding			
3.6	To promote the mainstreaming of disaster risk assessments into land use policy development and implementation, including urban planning, land degradation assessments and informal and non-permanent housing, and the use of guidelines and follow-up tools informed by anticipated demographic and environmental changes;	2. Risks of land management practices exacerbating flood risk		X	
3.7	To promote the mainstreaming of disaster risk assessment, mapping and management into rural development planning and management of, inter alia, mountains, rivers, coastal flood plain areas, dry lands, wetlands and all other areas prone to droughts and flooding, including through the identification of areas that are safe for human settlement, and at the same time preserving ecosystem functions that help to reduce risks;	3. Risks to habitats & heritage in the coastal zone from sea level rise; loss of natural flood protection	X	X	
		4. Risks to viability of coastal communities from sea level rise	X		
		5. Risks of sewer flooding due to heavy rainfall			X
1.4	To systematically evaluate, record, share and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event-specific hazard exposure and vulnerability information	6. Risks to infrastructure from river, surface/groundwater flooding		X	
		7. Risks to infrastructure from coastal flooding and erosion		X	X
		8. Risks to people, communities & buildings from flooding	X	X	X
		9. Risks to onshore infrastructure from storms and high waves		X	
3.15	To increase business resilience and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices;	10. Risks to business sites from flooding			

6. FINANCIAL INVESTMENT

6.1 Sources of international funding for climate change projects

The Green Climate Fund is a fund established within the framework of the United Nations Framework Convention on Climate Change (UNFCCC) as an operating entity of the Financial Mechanism to help developing countries in adaptation and mitigation practices to respond to climate change. GCF provides loans as well grants to facilitate the chosen projects. Table 8 shows the list of project areas entitled to apply for the grant.

Table 12: Mitigation and Adaptation Climate Change Projects

MITIGATION	ADAPTATION
Reduce emission from: <ul style="list-style-type: none">• Energy generation and access• Transport• Forests and land use• Building cities, Industries and appliances	<ul style="list-style-type: none">• Increase resilience of Health food and water security• Livelihoods of people and communities• Ecosystems and ecosystem services• Infrastructure and built environment

Source: UN Framework Convention on Climate Change (UNFCCC). Green Climate Fund, 2010.

Table 13 shows the list of projects supported by the Green Climate Fund (GCF) related to water and climate change per se. Also, there are specific information's on the purpose of the projects, the outcome as well the financing sources for the projects. The other financing sources for the projects come from government and private Grants, Loans and Equity. The objectives of the projects include establishing early warning systems, creating flood risk awareness, providing training for alternative income generating activities and strengthening the resilience.

Table 13: Identified Projects supported by Green Climate Change Fund

No	C	Project Name	B	Country	I	Objectives	GCF Result Areas	UN SDGs	F	P S	ES	TI	GCF Financing		Co-financing			EIP
													L	G	L	G	E	
2.	FP018	Scaling-up of Glacial Lake Outburst Flood (GLOF) risk reduction in Northern Pakistan	29.23 3m	Pakistan	A	To establish early warning systems, engineering structures and disaster management policies of flood.	Health, food and water security Livelihoods of people and communities	Industry, innovation and infrastructure	P	S	B	37.5		37	0.5			5
3.	FP021	Senegal Integrated Urban Flood Management Project	2.2m	Senegal, Africa	A	Create flood risk awareness targeted toward risks to women and children; taking into account the role of women in non-structural flood risk management particularly health risk prevention, waste and wastewater disposal.	Livelihoods of people and communities and Infrastructure and built environment	Industry, innovation and infrastructure	P	M	A	80.7		17	56.8	17	6.8	5
4.	FP037	Integrated Flood Management to Enhance Climate Resilience of the Vaisigano River Catchment in Samoa	37.0k	Samoa	A	To provide training for alternative income generating activities, business incubation for entrepreneurial agribusinesses and climate change and flood-related business options, with targets set for women and young people to participate.	Livelihoods of people and communities Infrastructure and built environment	Industry, innovation and infrastructure	P	M	B	65.7		57.7		8		6
5.	FP061	Integrated physical adaptation and community resilience through an enhanced direct access pilot in the public, private, and civil society sectors of three Eastern Caribbean small island developing states	82.2k	Antigua and Barbuda, Dominica, Grenada	A	Strengthening the resilience of three Caribbean islands to climate change-related threats by improving the hurricane resilience of community buildings, homes, and businesses, and through flood prevention measures.	Livelihoods of people and communities Ecosystems and ecosystem services Infrastructure and built environment		P	S	B	20		20				4
6.	FP012	Africa Hydromet Program - Strengthening Climate Resilience in Sub-Saharan Africa: Mali Country Project	5.3m	Mali	A	People-centered community-based early warning systems to directly address women's vulnerabilities and exposure to disaster risk	Health, food and water security Livelihoods of people and communities	Sustainable cities and communities	P	S	B	27.3		22.8		4.5		4
7.	FP016	Strengthening the resilience of smallholder farmers in the Dry Zone to climate variability and extreme events through an integrated approach to water management	2.0m	Sri Lanka	A	Empowering women producer groups and women in CBOs through enterprise development and income generation activities.	Health, food and water security Livelihoods of people and communities	Clean water and sanitation	P	M	B	52.1		38.1		14		7

8.	FP002	Scaling Up of Modernized Climate Information and Early Warning Systems in Malawi	2.1m	Malawi	A	Promote women's participation in community-based early warning systems.	Livelihoods of people and communities	Life on land	P	S	C	16.3		12.3		4		6
9.	FP004	Climate-Resilient Infrastructure Mainstreaming in Bangladesh	10.5 m	Bangladesh	A	Provide gender-friendly multipurpose cyclone shelters.	Livelihoods of people and communities Infrastructure and built environment	Sustainable cities and communities	P	M	B	80		40		40		6

Source: UN Framework Convention on Climate Change (UNFCCC). Green Climate Fund, 2010.

Note: Code=C, Beneficiaries=B, Impact=I, Mitigation=M, Adaptation=A, UN Sustainable Development Goals=UN SDGs, Financing=F, Public=P, Project Size=PS, Small=S, Medium=M, E and S Risk Category=ES, Category A=A, Category B=B, Category C=C, Total Investment (million, USD)=TI, Loan=L, Grant=G, Equity (m,USD)=E, Est. Implementation period(years)=EIP

6.2 Potential Flood Projects in Malaysia

Table 14 shows the specific activities carried out in the countries receiving/received the Green Climate Fund as well the proposed activities during the stakeholder workshop. The specific activities related to water and climate change were ascertained in each of the projects that have received the grant. Hence, Table 10 acts as a template to facilitate GCF grant application with the purpose to enhance chances to secure either loans or grants from GCF. However, this should also be followed by the estimation of the estimated amount of fund required.

Table 14: Potential flood and climate change projects in Malaysia

Flood and climate change	Source	Policy (Thrusts)	Priority (Sendai No.)
1. Investing in drainage infrastructure	Green Climate Fund	National Policy on Climate Change (3)	3(3)
2. Establishing a national disaster risk management policy Flood risk mapping	Green Climate Fund	National Water Resources Policy (4)	3(6)
3. Flood-proof key infrastructure upgrade downstream areas to increase river capacity	Green Climate Fund	National Policy on Climate Change (3)	3(3)
4. Structural measures including (damns, ponds, spill ways, Storm surge buffers)	Stakeholder workshop and Green Climate Fund	National Water Resources Policy (4)	3(3)
5. Tree plantation/ Planting and rehabilitation of mangrove forests/restore wetlands	Green Climate Fund	National Water Resources Policy (4)	1(4) and 4(10)
6. Resilient design features in new houses systematized climate risk assessments	Green Climate Fund	National Policy on Climate Change (4)	3(3)
7. Building systems to ensure that early warnings reach the municipal	Green Climate Fund	National Policy on Climate Change (1)	4(2)
8. Community awareness programme at local level	Stakeholder workshop and Green Climate Fund	National Policy on Climate Change (4)	4(4)
9. Expand the meteorological network (e.g) Hydrological monitoring stations Lake-based weather buoys	Green Climate Fund	National Water Resources Policy (1)	4(2)
10. Training to enhance the capacity of local communities, district councils, and national agencies to respond to flood	Stakeholder workshop and Green Climate Fund	National Water Resources Policy (7)	4(6)
11. Improvement in flood modelling for river systems	Green Climate Fund	National Water Resources Policy (1)	4(2)
12. New cyclone shelters	Green Climate Fund	National Water Resources Policy (4)	3(3)
13. Renovating existing shelters	Green Climate Fund	National Water Resources Policy (4)	3(3)

14. Flood mitigation programme	Stakeholder workshop	National Policy on Climate Change (2)	4(1)
15. Pilot project to demonstrate the Integrated Flood Management	Stakeholder workshop	National Water Resources Policy (4)	1(13)
16. Organise consultation workshop: develop the flood disaster response SOPs	Stakeholder workshop	National Water Resources Policy (7)	3(13)
17. Organise training programme on (technical and logistics) aspects in flood disaster response	GCF	National Water Resources Policy (4)	4(8)
18. Implementation of disaster risk reduction (Review / assess gaps in existing laws, regulations and policies/Allocation of finance and logistics at all levels of administration)	Stakeholder workshop	National Water Resources Policy (4)	4(10)
19. Hands-on training to acquire experience for selected personnel and voluntary workers via attachment programmes with neighbouring countries in the region with extreme flood events	Stakeholder workshop	National Policy on Climate Change (10)	4(8)
20. School curriculum and education module since kindergarten	Stakeholder workshop	National Policy on Climate Change (4)	4(4)
21. Module input for media	Stakeholder workshop	National Policy on Climate Change (4)	4(4)

7. SUMMARY

In preparing the report, the secondary sources of data like research articles, books, reports (both printed and electronic materials) were examined against the global indicators of the four priorities in the Sendai Framework. This include priority 1: (Understanding Disaster Risk); priority 2: (Strengthening disaster risk governance to manage disaster risk); priority 3: (Investing in disaster risk reduction for resilience) and Priority 4: Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery rehabilitation and reconstruction in the Sendai Framework. The utilization of the Steven coveys Time Management Matrix has successfully helped in identifying the priorities in disaster management per se in Malaysia as well water and climate change development programmes. Specifically, addressing the priority of the 59 items in the Sendai Framework into Short Term and Important (STI), Medium and Important (MI), Medium and Somewhat Important (MSI), Long and Somewhat Important (LSI) categories.

The report has successfully identified 20 priorities for flood and climate change development programme in Malaysia. This was done successfully by identifying through a stakeholder workshop, benchmarking the flood and coastal changes priority projects in UK and identification of the flood and climate change activities done by the countries which have secured the Green Climate Fund (GCF). Some of the findings include education and public awareness, coordination among governmental and non-governmental agencies, effective stakeholder participation, and early warning systems for flood preparedness. The involvement of multiple stakeholders is hoped to favor a holistic decision making pertaining to water and climate change development programmes in Malaysia. On the other side, a more concerted and extensive inclusion of communities in disaster preparedness management will be important in reducing the subsequent impacts on them in both flood and drought situations.

Overall, the findings from this report are useful to the Government Federal and State level agencies specifically related for water and water utilities management, National Water Council, Department of Irrigation and Drainage; Public Water Supply Departments and Wastewater Department in facilitating water and climate change development programmes in Malaysia. Also, the hope is that the findings will serve the designated national focal point for implementing the Sendai Framework for Disaster Risk Reduction 2015–2030.

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APPENDIX 1 – GAP ANALYSIS TABLES

Focus on Flood Disaster Management using Sendai Framework for Disaster Risk Reduction 2015-2030

Priority 1: Understanding disaster risk

Policies and practices for disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be leveraged for the purpose of pre-disaster risk assessment, for prevention and mitigation and for the development and implementation of appropriate preparedness and effective response to disasters.

Goal	Current Achievement	Gaps	Causes	Solutions
1. To promote the collection, analysis, management and use of relevant data and practical information and ensure its dissemination, taking into account the needs of different categories of users, as appropriate;	The National IWRM Information Repository System has been established and launched officially in 2012.	Currently the National IWRM Information Repository System is not used widely by general public, mostly only by water engineers	Although the website is launched, the general public is still unaware of it.	Greater publicity and also training on application for flood and drought forecasting is important. Academia, scientific and research entities can be encouraged to be more involved in studying and focussing on the disaster risk factors and different scenarios, at national and local level in order to support action by relevant agencies, local authorities and communities.
2. To encourage the use of and strengthening of baselines and periodically assess disaster risks, vulnerability, capacity, exposure, hazard characteristics and their possible sequential effects at the relevant social and spatial scale on ecosystems, in line with national circumstances;	There are 189 river basins throughout Malaysia, 89 of them prone to become recurrent flooding. At present more than 26 river basin studies have been conducted including recommendations on implementation.	Not all are in implementation since the issues cover inter-institutional authorities and participation of all public stakeholders. An appropriate institutional framework, a clear policy and strategic and effective implementation of plans are required to alleviate some of the current difficulties. Not all river reserve areas have been gazetted as such under the law.	Lack of sufficient financial, institutional and human resources to implement, as well as political will. Low participation from NGOs and local communities is another main problem. Intrusion into, and loss of, river reserve areas which act as flood buffer zones. Other issues identified are: i) Lack of legal requirement, ii) Low level of awareness among decision makers, iii) Political interference.	Effective management of water resources requires full participation from the various stakeholders and a holistic approach. This needs to include awareness building at both the political and community level, as well as institutional and legislative strengthening. Academia, scientific and research entities to be involved in the analysis of previous flood occurrence data.
3. To develop, periodically update and disseminate, as appropriate, location-based disaster risk information,	During the Tenth Malaysia Plan (2011–2015), 194 flood mitigation projects were implemented and 34 local scale	Detailed information on historical flood areas and potential flood risk areas are not normally disseminated	No formal policy on public dissemination of historical or forecast flood information as this may have security and land use planning implications.	Develop policy and implementation approach for public dissemination of historical and/or forecast flood areas.

Goal	Current Achievement	Gaps	Causes	Solutions
including risk maps, to decision makers, the general public and communities at risk of exposure to disaster in an appropriate format by using, as applicable, geospatial information technology;	flood hazard maps were developed to facilitate disaster prevention implementation. In the 11th Malaysia Plan (2016-2020), DID has committed to carry out another six more Flood Hazard Maps at river basin level. Flood prone area map developed by the DID only give general indication of the areas at risk in large scale. More detailed flood risk maps are developed primarily for internal planning purposes. Climate change impact on rainfall and river discharge have been modeled by NAHRIM.	to the general public. Forecast flood risk map do not fully incorporate climate change impacts. Model results by NAHRIM are in the form of technical reports not generally accessible or understood by the public.	Socio-political ramifications of historical information not fully understood and may be sensitive in relation to land use and land ownership. Historical flood maps are not necessarily indicative of future floods due to flood mitigation measures which have been taken and changing land uses.	
4. To systematically evaluate, record, share and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event-specific hazard-exposure and vulnerability information;	Seasonal monsoon floods have resulted in an average annual direct loss amounting to RM915 million. However, in 2014, the extreme floods resulted in damage to public infrastructure amounting to RM2.9 billion. Estimates of financial losses are mainly focused on losses due to impact on national and government infrastructure. Government provides some aid to flood victims and rehabilitation projects are implemented.	Individual, personal, victim losses are not recorded. The full cost of rehabilitation projects to assist flood victims to relocate is not generally known.	No national level survey or database on individual victim losses. In many cases non-victims claim losses in order to obtain government aid complicating any assessment. Rehabilitation projects are often carried out together with or under community or rural development budgets.	Develop a methodology to obtain reliable data on flood victim losses and losses to public infrastructure.
5. To make non-sensitive hazard-exposure, vulnerability, risk, disaster and loss-disaggregated information freely available and accessible, as appropriate;	Academic and technical studies conducted on flood impacts. DID has developed flood hazard map as a step for formulation and evaluation of effective implementation of either structural or non-structural flood mitigation	Results of studies, maps, not generally disseminated to general public or only in a summary form.	No formal policy on identifying non-sensitive data and information which can be shared with the general public. Fear of misuse, misinterpretation or politicisation of the data and information by individuals and/or media.	Develop guidelines on what type of information may be made public.

Goal	Current Achievement	Gaps	Causes	Solutions
	measures			
6. To promote real time access to reliable data, make use of space and in situ information, including geographic information systems (GIS), and use information and communications technology innovations to enhance measurement tools and the collection, analysis and dissemination of data;	There is a National Flood Forecasting and Warning System (NaFFWS) set-up with website for the general public. Malaysia/UK collaboration project involving public-private partnership is focussed on developing an Earth and Sea Observation System (EASOS). The foundation of the work based on satellite enhanced flood modelling capability together with specialist teams of weather and flood forecasting experts. The 18 month project began in December 2016 and the trial run is expected to be completed by May 2018.	The 18 month project began in December 2016 and the trial run is expected to be completed by May 2018.	Previous warning systems were insufficiently maintained and updated, vandalism of equipment at stations, complacency on part of community in response to flood warnings.	To evaluate the EASOS in operational mode. Academia, scientific and research entities to be involved in the evaluation of the system.
7. To build the knowledge of government officials at all levels, civil society, communities and volunteers, as well as the private sector, through sharing experiences, lessons learned, good practices and training and education on disaster risk reduction, including the use of existing training and education mechanisms and peer learning;	Awareness and training courses conducted by DID and NGOs. For example MyCWP with Global Environment Centre conducted 3 community level training at the end of 2016.	Intermittent awareness and training only in the period before expected natural floods occur during the Northeast monsoon season.	Lack of finance and human resources for conducting the training.	Advocate that Local Councils with NADMA, DID and other relevant agencies conduct regular training especially just prior to the seasonal flood periods. Special training of relief workers and repeated simulation exercises to refresh relief workers on protocols. Sharing of experiences by seasoned relief workers to provide support for those who are newly involved.
8. To promote and improve dialogue and cooperation among scientific and technological communities, other relevant stakeholders and policymakers in order to facilitate a science policy interface for effective decision-making in disaster risk management;	In 2015, the Malaysian Government allocated special funds to the Ministry of Higher Education for research projects focused on the extreme floods of 2014-2015. National level seminars were conducted in 2015 and 2016 on the findings of the projects. Recommendations on policy and strategies were made and	A summary report of the findings and recommendations has not yet been released to the general public.	The recommendations are expected to be under consideration at the Ministry and/or Cabinet level.	Conduct further forum to disseminate results of recommendations and decisions made by the relevant authorities. Academia, scientific and research entities to be involved in the policy development.

Goal	Current Achievement	Gaps	Causes	Solutions
	submitted to the Ministry.			
9. To ensure the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment and the development and implementation of policies, strategies, plans and programmes of specific sectors, with a cross-sectoral approach, which should be tailored to localities and to the context;	In 2015, the Malaysian Government allocated special funds to the Ministry of Higher Education for research projects focused on the extreme floods of 2014-2015. National level seminars were conducted in 2015 and 2016 on the findings of the projects. One theme was on community knowledge on flood disaster. Recommendations on policy and strategies were made and submitted to the Ministry.	A summary report of the findings and recommendations has not yet been released to the general public.	The recommendations are expected to be under consideration at the Ministry and/or Cabinet level.	Conduct further forum to discuss and disseminate results of recommendations and decisions made by the relevant authorities, academia, scientific and research institutions. Incorporation of traditional, indigenous and local knowledge and practices in training on guidelines on development and implementation of Integrated River Basin Management recommendations; preparation of guidelines and design standards for climate change adaptation; resettlement of population; and community level flood proofing measures.
10. To strengthen technical and scientific capacity to capitalize on and consolidate existing knowledge and to develop and apply methodologies and models to assess disaster risks, vulnerabilities and exposure to all hazards;	Malaysian flood management is based on structural and technological measures to control floods. Non-structural measures uses the guidance document Urban Stormwater Management Manual (MSMA) which is mandatory.	Unpredictable floods, flash floods and extreme flood events still occur.	Changing hydro-meteorological changes due urbanisation and climate change has increased unpredictability of flood hazards, especially in urban areas. This has impacted on the current measures taken which are based on data of hydro-climate conditions which occurred over the past 50 years.	Allocate special budget and encourage research in flood disaster risk management.
11. To promote investments in innovation and technology development in long-term, multihazard and solution-driven research in disaster risk management to address gaps, obstacles, interdependencies and social, economic, educational and environmental challenges and disaster risks;	In 2015, the Malaysian Government allocated special funds to the Ministry of Higher Education for research projects focused on the extreme floods of 2014-2015. National level seminars were conducted in 2015 and 2016 on the findings of the projects. Recommendations on policy and strategies were made and submitted to the Ministry.	A summary report of the findings and recommendations has not yet been released to the general public.	The recommendations are expected to be under consideration at the Ministry and/or Cabinet level.	Conduct further forum to disseminate results of recommendations and decisions made by the relevant authorities. Encourage innovation by providing special funding for flood disaster relief projects.
12. To promote the incorporation of disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation, in formal and	In 2015, the Malaysian Government allocated special funds to the Ministry of Higher Education for research projects focused on the extreme floods of 2014-2015. National level	A summary report of the findings and recommendations has not yet been released to the general public.	The recommendations are expected to be under consideration at the Ministry and/or Cabinet level.	Conduct further forum to disseminate results of recommendations and decisions made by the relevant authorities and encourage the incorporation of such information in the school, college, university curricula, as well as through non-

Goal	Current Achievement	Gaps	Causes	Solutions
non-formal education, as well as in civic education at all levels, as well as in professional education and training;	seminars were conducted in 2015 and 2016 on the findings of the projects. Recommendations on policy and strategies were made and submitted to the Ministry.			formal education courses or training and the media.
13. To promote national strategies to strengthen public education and awareness in disaster risk reduction, including disaster risk information and knowledge, through campaigns, social media and community mobilization, taking into account specific audiences and their needs;	Department of Irrigation and Drainage (DID) has adopted the Integrated River Basin Management (IRBM) and the Integrated Flood Management (IFM) approaches for its flood management programmes.	Only limited media campaigns on IRBM and IFM to the general public.	Lack of budget and human resources to lead the campaign. DID do not have officers who have a media communications background as the department is considered as a technical department. All the officers must have an engineering degree.	Identify national strategies to strengthen public education and awareness in flood disaster risk reduction. Human resources background for the DID need to incorporate officers with different qualifications suitable to handle all processes relevant to flood response and disaster management.
14. To apply risk information in all its dimensions of vulnerability, capacity and exposure of persons, communities, countries and assets, as well as hazard characteristics, to develop and implement disaster risk reduction policies;	National Disaster Management System (NDMS) is able to support the disaster management at a federal level by providing information management that includes data analysis, historical data, activity monitoring and action status.	The System is not accessible by the general public.	The information is regarded as confidential and sensitive.	Identify which type of information would be useful for the general public and can be made available.
15. To enhance collaboration among people at the local level to disseminate disaster risk information through the involvement of community-based organizations and nongovernmental organizations.	In 2015, the Malaysian Government allocated special funds to the Ministry of Higher Education for research projects focused on the extreme floods of 2014-2015. National level seminars were conducted in 2015 and 2016 on the findings of the projects. Recommendations on policy and strategies were made and submitted to the Ministry.	A summary report of the findings and recommendations has not yet been released to the general public.	The recommendations are expected to be under consideration at the Ministry and/or Cabinet level.	Conduct further forum to disseminate results of recommendations and decisions made by the relevant authorities.

Priority 2: Strengthening disaster risk governance to manage disaster risk

Disaster risk governance at the national, regional and global levels is of great importance for an effective and efficient management of disaster risk. Clear vision, plans, competence, guidance and coordination within and across sectors, as well as participation of relevant stakeholders, are needed. Strengthening disaster risk governance for prevention, mitigation, preparedness,

response, recovery and rehabilitation is therefore necessary and fosters collaboration and partnership across mechanisms and institutions for the implementation of instruments relevant to disaster risk reduction and sustainable development.

Goal	Current Achievement	Gaps	Causes	Solutions
<p>1. To mainstream and integrate disaster risk reduction within and across all sectors and review and promote the coherence and further development, as appropriate, of national and local frameworks of laws, regulations and public policies, which, by defining roles and responsibilities, guide the public and private sectors in:</p> <p>i. addressing disaster risk in publically owned, managed or regulated services and infrastructures;</p> <p>ii. promoting and providing incentives, as relevant, for actions by persons, households, communities and businesses;</p> <p>iii. enhancing relevant mechanisms and initiatives for disaster risk transparency, which may include financial incentives, public awareness-raising and training initiatives, reporting requirements and legal and administrative measures; and</p> <p>iv. putting in place coordination and organizational structures</p>	<p>Since 1971 Malaysia has :</p> <p>(a) established of the Permanent Flood Control Commission;</p> <p>(b) established flood disaster relief machinery;</p> <p>(c) carried out of river basin studies and preparation of drainage master plans for major towns;</p> <p>(d) implemented structural measures;</p> <p>(e) implemented non-structural measures;</p> <p>(f) set up of flood forecasting and warning systems; and</p> <p>(g) set up of a nation-wide network of hydrological and flood data collection stations.</p> <p>Most of these responsibilities are carried out by the DID. Flood response is under the National Security Council (NSC).</p> <p>In 1997, Directive No. 20 was developed and this contains the Policy and Mechanism of the National Disaster Management and Relief under the National Security Council (NSC). This was updated in 2012.</p> <p>States have gazetted river reserves and river catchment areas in order to control land use development.</p> <p>After the extreme floods of 2014-2015, the government set up the National Disaster Management Agency (NADMA), in December 2015,</p>	<p>Flood disaster management was previously managed by the Disaster Management and Relief Committee (DMRC), with uniformed services and local council providing logistical support, and support in terms of data from the DID and Malaysian Meteorological Service (MMS).</p> <p>The main aim of this mechanism was for disaster response and reduction from the logistical and technical view.</p> <p>Issues arise in the distribution of disaster relief at improperly managed evacuation centres. This include the irregular, inadequate and slow assistance provided to victims by the agencies involved.</p> <p>Different management practices among agencies also may result in conflicts.</p> <p>Resettlement after floods should be evaluated in order to be implemented for future improvements.</p>	<p>Response is adequate for local flood events and also for normal flood season conditions. However, the mechanisms were tested severely in the recent unusual extreme flood events which affected several states at the end of 2014.</p> <p>The relief agency personnel have their resources thinly stretched among the simultaneous operations in different locations.</p> <p>Relief workers have not been fully trained in assisting in the psychological trauma faced by victims.</p> <p>Relief workers only intermittently undergo simulation exercise.</p> <p>Evacuation centres often are inspected only when they are likely or need to be used.</p> <p>Insufficient budget and human resources to maintain standards and quality required.</p>	<p>NADMA has to take a holistic approach and strengthen the disaster management mechanism.</p> <p>Liaise with NADMA on flood disaster management.</p> <p>Integrated planning and management; operations and maintenance of utilities and facilities need to be enhanced.</p> <p>Involvement of all parties in the flood disaster management mechanism.</p> <p>The Ministry of Natural Resources and Environment (NRE) together with State Water Resources Authorities (SWRA) is proposing to continue to gazette :</p> <p>a) Designated flood protection zones;</p> <p>b) Protection of catchment areas including lakes and reservoirs;</p> <p>c) River reserves, buffer zones;</p> <p>d) Licensing arrangements; and</p> <p>e) Fines and penalties.</p> <p>Develop cross-sector Financing Models as part of the Water-Energy-Food Nexus management and multi-use of existing and new infrastructure, in line with the National Blue Ocean Strategy.</p>

	to coordinate government agencies in tackling all disasters.			
2. To adopt and implement national and local disaster risk reduction strategies and plans, across different timescales, with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience;	Malaysia has a National Water Resources Council. Malaysia has a National Water Resources Policy (NWRP) in 2012. The action plans will take into consideration the National Policy on Climate Change of Malaysia. Academy of Sciences Malaysia (ASM) has instituted Stakeholder Forums on inter-sector water demand management. MyCWP has been collaborating in these forums. The ASM has recently published a recommendation paper on 'Transforming the Water Sector: National Integrated Water Resources Management Plan, Strategies and Road Map' in 2016.	Policy needs to be translated into Action Plans. Action plans are mostly focussed on structural measures which can be easily quantified in financial terms.	Societal changes are often difficult to measure and occur over a longer period of time. Much of society perceive that government should take the action instead of themselves. There is no clear mechanism on how community can engage on disaster management issues.	Advocate that Action Plans have a component related to society/community awareness and education, as well as community engagement and participation over a longer period of time, not only in the project phase but also in operational phase. Community flood/drought preparedness training can be one of the themes.
3. To carry out an assessment of the technical, financial and administrative disaster risk management capacity to deal with the identified risks at the local and national levels;	Aspects of flood mitigation and flood fighting have been implemented in urban areas, and fast growing development areas through use of mandatory Urban Stormwater Management Manual (MSMA), in 2001. In May 2012, DID Malaysia launched the MSMA 2nd Edition.	Additional works are still needed for flood control dams, canalisation and related works, river bunds, flood storage ponds; poldering; flood diversion tunnels.	The cost for future river improvement and flood mitigation works for the next decade was previously estimated to amount to more than RM15 billion. The source of funding for these projects need to come from government budget which is affected by the current global economic scenario.	There is a proposed National Water Resources Act which should also include clauses related to flood management to ensure issues related to flood be addressed in a holistic and integrated approach in evaluating the institutional capacity needed to manage flood disasters. .
4. To encourage the establishment of necessary mechanisms and incentives to ensure high levels of compliance with the existing safety-enhancing provisions of sectoral laws and regulations, including those addressing land use and urban planning, building codes, environmental	In December 2015, the government set up the National Disaster Management Agency (NADMA) to coordinate government agencies in tackling all disasters. NADMA is set up manage and coordinate efforts against disasters in the country,	There is uncoordinated land use control at the local authority level with respect to flood hazard. Land use control is not guided by the river basin area. There is no single agency that has considered all the different provisions, laws	Local Authorities and planners are lack detailed knowledge of flooding mechanism and flood risks in their area, or their river basin. Legal aspects had not been previously considered to an important consideration in flood management. NADMA has only recently been set up. NADMA has small staff strength as it has	All States that do not have any Water Resources Management (WRM) law should adopt the NWR Law for enforcement of land use control at the local level to support WRM objectives. IRBM plans should be developed for all the 189 river basins in the country which are greater than 80 sq. km. NADMA has to consider the legal provisions related to disaster management

and resource management and health and safety standards, and update them, where needed, to ensure an adequate focus on disaster risk management;	together with disaster management related agencies, such as the Malaysian Armed Forces, police, Malaysian Civil Defence Department, Fire and Rescue Department, Social Welfare Department.	and regulations that are considered related to flood management. A research project on developing a GIS on legal aspects related to flood management relevant for the public, in the state of Selangor, found difficulty in identifying which laws may be relevant.	still a new agency and it will take some time to implement new projects.	mechanism. Identify flood risk areas as Environmentally Sensitive Areas in terms of environmental disaster.
5. To develop and strengthen, as appropriate, mechanisms to follow up, periodically assess and publicly report on progress on national and local plans; and promote public scrutiny and encourage institutional debates, including by parliamentarians and other relevant officials, on progress reports of local and national plans for disaster risk reduction;	There are Integrated River Basin Management Plans developed for more than 26 river basins. In 2012, MyWP, with support from MyCWP, initiated a Malaysia Water Resources Management (MyWRM) Forum as a biennial programme. This Forum serves as a multisector platform to bring public, private, academia and NGOs together to discuss water security, and flood and drought risk issues. The MyWP forum has included flood hazards in its inaugural forum. The next MyWRM Forum will be held in 2018.	Since land use is a State issue, implementation of land use control under the IRBM is under the purview of the State and Local Authorities. However, they have inadequate technical capacity to monitor the implementation of IRBM plans. Review of flood disaster mechanism under Directive No. 20 is carried out by the National Security Council (NSC). Inadequate technical capacity to monitor the implementation of IRBM master plans	States should set up State Water Resources Agencies (SWRA) to monitor the implementation of IRBM plans, and also to work with the proposed Federal National Water Resources Department (NWRD) to update the plans. Flood disaster response was already regulated under Directive No. 20 under the NSC and the information are considered confidential.	Advocate for States to set up their SWRA. Provide training and sharing of experiences among States in establishing such an authority. Include NADMA officials in the next forum to present their projects and programmes for improving the flood disaster management mechanism.
6. To assign, as appropriate, clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks, and undertake comprehensive public and community consultations during the development of such laws and regulations to support	The Integrated Flood Management (IFM) programmes are supposed to be organised annually. Flood Mitigation Master Plans include consideration of legal and institutional aspects as well as stakeholder surveys. There is a MyCWP GWP-WACDEP project on community training for flood	Only a few IFM workshops have been conducted. Some Flood Mitigation Master Plans have not undertaken comprehensive public and community consultations. At present the GWP-WACDEP project proponents are discussing replication for another	Lack of financing for further expansion of the IFM workshops. Need to develop relationships with local authorities to generate greater interest	Flood Mitigation Master Plans that have been prepared very much earlier without taking into consideration the holistic and integrated approach need to be reviewed. Work with the relevant agencies, such as DID and local authorities, to do a Training of Trainers course for community-level flood preparedness.

their implementation;	preparedness completed 2016. There is another small WACDEP demonstration project on community-level rainfall harvesting as a measure in response to flood and drought conditions..	community. Training is only implemented on an ad hoc way based on financing and sponsorship availability.		
7. To establish and strengthen government coordination forums composed of relevant stakeholders at the national and local levels, such as national and local platforms for disaster risk reduction, and a designated national focal point for implementing the Sendai Framework for Disaster Risk Reduction 2015–2030. It is necessary for such mechanisms to have a strong foundation in national institutional frameworks with clearly assigned responsibilities and authority to, inter alia, identify sectoral and multisectoral disaster risk, build awareness and knowledge of disaster risk through sharing and dissemination of non-sensitive disaster risk information and data, contribute to and coordinate reports on local and national disaster risk, coordinate public awareness campaigns on disaster risk, facilitate and support local multisectoral cooperation (e.g. among local governments) and contribute to the determination of and reporting on national and local disaster risk management plans and all policies relevant for disaster	<p>In December 2015, the government set up the National Disaster Management Agency (NADMA) to coordinate government agencies in tackling all disasters. The core functions of NADMA are: (i.) Planning and Preparedness, (ii.) Operation Activities, and (iii.) Post Disaster Management. NADMA is set up manage and coordinate efforts against disasters in the country, together with disaster management related agencies, such as the Malaysian Armed Forces, police, Malaysian Civil Defence Department, Fire and Rescue Department, Social Welfare Department. The Drainage and Irrigation Department (DID) have adopted Integrated Flood Management approach where the concept is of 'Living with flood' based on the principles that:</p> <ul style="list-style-type: none"> • Employ a basin approach; • Treat floods as part of the water cycle; • Integrate land and water management; • Adopt a mix of strategies based on risk • management approaches; • Enable cooperation 	<p>Under the National Security Council (NSC), the previous disaster management mechanism focused mainly on the response mechanism. This has changed under the new agency, NADMA. NADMA has only recently been set up. The stakeholders involved are primarily government agencies which have been identified to be responsible for taking action during flood disaster response. The wider categories of stakeholders are not directly involved. This leads to mismatch in coordination logistics issues when NGOs and CBOs become involved in flood relief operations. The IFM approach is advocated by DID for implementation by State and Local Authorities, however, there is lack of momentum in implementing the approach.</p>	<p>Flood response is seen to be the responsibility of the government and flood disaster management is under the NSC. NADMA has small staff strength as it has still a new agency and it will take some time to implement new projects.</p>	<p>NADMA has to strengthen the disaster management mechanism. Include the participation of a wider group of stakeholders, such as NGOs, CBOs, organized voluntary work organizations, in working together with relevant agencies identified by NADMA. MyCWP can interact with NADMA to offer collaboration and assistance. DID is planning to conduct additional IFM workshops under the 11th Malaysia Plan.</p>

risk management. These responsibilities should be established through laws, regulations, standards and procedures.	between different agencies; and <ul style="list-style-type: none"> • Ensure a participatory approach 			
8. To empower local authorities, as appropriate, through regulatory and financial means to work and coordinate with civil society, communities and indigenous peoples and migrants in disaster risk management at the local level;	MyCWP/MyWP participate in facilitating technical seminars and public awareness programmes which conducted together with stakeholders in different locations around the country in conjunction with the national level World Water Day and World Rivers Day. MyCWP partners have developed a youth and community-based river appreciation and monitoring programme called “River Rangers” which is being implemented at the state level.	Training and projects are small scale and need to be implemented on a wider scale through out the country	Insufficient financial resources and limited human resources to conduct training on flood and drought management especially at community level .	Conduct training of trainers workshop in collaboration with local authorities and key government agencies to spread the practice. Gender perspectives and involvement of youth should also be included in these courses.
9. To encourage parliamentarians to support the implementation of disaster risk reduction by developing new or amending relevant legislation and setting budget allocations;	Parliamentarians are aware of the national disaster response mechanism. As elected representatives, they become involved in the response stage and also in the post-disaster stage in advocating for their constituents.	They are not directly involved in developing new or amending relevant legislation and setting budget allocations for disaster risk management as this was under the National Security Council.	Lack of awareness, understanding and guidance on the legal governance necessary.	Initiate programmes on awareness and education linking disaster management with legislation and land-use management at the state level.
10. To promote the development of quality standards, such as certifications and awards for disaster risk management, with the participation of the private sector, civil society, professional associations, scientific organizations and the United Nations;	Awards are given for environmental management, landscaping, green city. Awards are given to individual persons recognising their service in disaster response.	No national level awards for disaster risk management.	Lack of awareness, understanding and guidance.	Develop national level quality standards, such as certifications and awards for disaster risk management. Identify quality and standards required and make regular assessments.
11. To formulate public policies, where applicable, aimed at addressing the issues of	In several states river reserve areas have been gazetted to prohibit development and	There are no specific policies to ban/control development in potential	Lack of financial capacity; lack of awareness, understanding and guidance.	Gazette all river reserve areas and identify hazard areas of prohibited/controlled development; State authorities should

prevention or relocation, where possible, of human settlements in disaster risk-prone zones, subject to national law and legal systems.	control activities. Policies on development in Environmentally Sensitive Areas are available in the National Physical Plan.	flood risk areas. Many river reserve areas are not gazetted and are used as development areas, sometimes illegally. Reluctance of individuals to move out of hazard/disaster risk area.	Belief that engineering solutions can always be found to overcome problems. Developers seek to use any available land for development in urban areas.	designate the low-lying, undeveloped areas along a river corridor, that have been identified as flood detention zones in river basin Flood Mitigation (FM) master plan, as flood protection zones. There should be a FM master plan for every river basin, that highlights the undeveloped low-lying flood-prone areas where development has to be controlled.
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Priority 3: Investing in disaster risk reduction for resilience

Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation.

Goal	Current Achievement	Gaps	Causes	Solutions
1. To allocate the necessary resources, including finance and logistics, as appropriate, at all levels of administration for the development and the implementation of disaster risk reduction strategies, policies, plans, laws and regulations in all relevant sectors;	Budget is allocated annually to the DID to implement flood mitigation projects.	The measures taken are based on historical hydro-meteorological conditions which may not correctly indicate climate change induced variations.	Historical data does not incorporate the uncertainty due to climate change induced variations.	Incorporate risk-based thinking in allocating resources, using the results of NAHRIM climate change forecast models.
2. To promote mechanisms for disaster risk transfer and insurance, risk-sharing and retention and financial protection, as appropriate, for both public and private investment in order to reduce the financial impact of disasters on Governments and societies, in urban and rural areas;	Public funding given for flood mitigation projects in urban areas. MSMA guidelines is a mechanism for responsibility and financing from private sector developers. New government initiative, announced on 17 August 2017, to develop and subsidise flood insurance scheme for residents in flood high-risk areas.	Lack of financial mechanisms for flood risk preparedness, mitigation, control, response and recovery among different stakeholders.	Previous flood events are considered part of natural phenomena. Flash floods are often unpredictable. General public unaware of insurance possibilities. Only few insurers include floods/water damage in their policy.	Identify examples of mechanisms from other countries which can be applied in Malaysia.
3. To strengthen, as appropriate, disaster-resilient public and private investments, particularly through structural, non-structural and functional	Aspects of flood mitigation and flood fighting have been implemented in urban areas, and fast growing development areas through use of mandatory	Guidelines for construction and infrastructures are for existing situation and not for climate change induced extremes.	Lack of financial capacity and perception that a disaster is unlikely to occur in the near future. Extreme flood events are regarded to be rare, thus there is reluctant to invest for	Better education on awareness of extreme event occurrence especially as a result of climate change impacts on the hydro-meteorological system. New guidelines for potential extreme events

Goal	Current Achievement	Gaps	Causes	Solutions
disaster risk prevention and reduction measures in critical facilities, in particular schools and hospitals and physical infrastructures; building better from the start to withstand hazards through proper design and construction, including the use of the principles of universal design and the standardization of building materials; retrofitting and rebuilding; nurturing a culture of maintenance; and taking into account economic, social, structural, technological and environmental impact assessments;	drainage design guidelines (MSMA). Buildings have to fulfil certificate of fitness inspection prior to occupation.		these rare events..	in high risk zones. Identification of new measures which may need to be implemented due to climate change induced changes in hydro-meteorological conditions.
4. To protect or support the protection of cultural and collecting institutions and other sites of historical, cultural heritage and religious interest;	Identification of areas and buildings of interest.	No specific consideration given with respect to floods.	Lack of awareness, knowledge, understanding and guidance on the potential effects.	Identify heritage policy/planning needed, especially with respect to extreme flood events which may become more common occurrences.
5. To promote the disaster risk resilience of workplaces through structural and non-structural measures;	Building codes need to be complied with.	No specific consideration given with respect to floods.	Lack of awareness, knowledge, understanding and guidance on the potential impacts.	Identify relevant codes especially with respect to extreme events which may become more common occurrences. Identify quality and standards required and make regular inspections especially prior to the flood season.
6. To promote the mainstreaming of disaster risk assessments into land-use policy development and implementation, including urban planning, land degradation assessments and informal and non-permanent housing, and the use of guidelines and follow-up tools informed by anticipated demographic and environmental changes;	National Physical Plan-2 (NPP2) prepared by Federal Department of Town and Country Planning, Ministry of Housing and Local Government (2010) and the National Urbanization Policy have considered sustainable land-use in the face of climate change impacts.	The NPP2 was last reviewed 7 years ago. The extreme flood events faced in 2014-2015, indicate that there should be new consideration of extreme events which may not have been fully considered previously.	Historical data does not fully indicate the challenges faced in view of climate change impacts.	Review policy with respect to extreme events which may become more common occurrences.
7. To promote the mainstreaming	The following studies have	Many of the results of the	The translation of study recommendation	Review and identify key recommendations

Goal	Current Achievement	Gaps	Causes	Solutions
of disaster risk assessment, mapping and management into rural development planning and management of, inter alia, mountains, rivers, coastal flood plain areas, drylands, wetlands and all other areas prone to droughts and flooding, including through the identification of areas that are safe for human settlement, and at the same time preserving ecosystem functions that help to reduce risks;	been conducted in relation to climate change induced disasters: National Coastal Vulnerability Index Study, Climate Change and its Relationship to Disease Patterns in Malaysia, National Physical Plan-2 (includes Environmentally Sensitive Areas), Impact of Climate Change on Hydrologic Regime and Water Resources in Peninsular Malaysia.	studies have remained "on the shelf" and not translated into implementation.	to implementation takes a considerable period of time and also financial commitment.	and timelines for action, especially with respect to the National Water Resources Policy and the National Policy on Climate Change.
8. To encourage the revision of existing or the development of new building codes and standards and rehabilitation and reconstruction practices at the national or local levels, as appropriate, with the aim of making them more applicable within the local context, particularly in informal and marginal human settlements, and reinforce the capacity to implement, survey and enforce such codes through an appropriate approach, with a view to fostering disaster-resistant structures;	Existing building codes are reviewed when disasters are identified to require some changes to be made.	Flood has not been identified to be an event which requires a change in the building code.	Lack of awareness and understanding on the impact of building design on community resilience to flood disaster.	Educate on the design guidelines used in other countries, e.g. FEMA, USA, for buildings located in a flood risk zone.
9. To enhance the resilience of national health systems, including by integrating disaster risk management into primary, secondary and tertiary health care, especially at the local level; developing the capacity of health workers in understanding disaster risk and applying and implementing disaster risk reduction	Study on 'Climate Change and Its Relationship to Disease Patterns in Malaysia' has been conducted. Relief workers are trained in management of the relief centre in terms of organisation, procedures and communications under the formal flood disaster management mechanism. The Ministry of Health (MOH)	Training of response staff focus on the individuals directly responsible in the flood response mechanism at the state level. Much of the training is in primary and secondary level health care and prevention of spread of water-borne diseases.	Limitation in the number of trained staff available in managing large or wide-scale disasters.	Improve training capacity across all health staff levels, especially at the local level, including for community based organisations.

Goal	Current Achievement	Gaps	Causes	Solutions
approaches in health work; promoting and enhancing the training capacities in the field of disaster medicine; and supporting and training community health groups in disaster risk reduction approaches in health programmes, in collaboration with other sectors, as well as in the implementation of the International Health Regulations (2005) of the World Health Organization;	initiated the Water Safety Plan for Malaysia since 2012. The main focus of MOH is in non-communicable diseases. During the 2014 – 2015 floods the effect of this Plan was evident when the outbreak of waterborne diseases was prevented through awareness, advocacy and capacity building programmes.			
10. To strengthen the design and implementation of inclusive policies and social safety-net mechanisms, including through community involvement, integrated with livelihood enhancement programmes, and access to basic health-care services, including maternal, newborn and child health, sexual and reproductive health, food security and nutrition, housing and education, towards the eradication of poverty, to find durable solutions in the post-disaster phase and to empower and assist people disproportionately affected by disasters;	In December 2015, the government set up the National Disaster Management Agency (NADMA) to coordinate government agencies in tackling all disasters. The core functions of NADMA are: (i.) Planning and Preparedness, (ii.) Operation Activities, and (iii.) Post Disaster Management	In post-disaster, the type of assistance and placement to be given to the victims is not clearly stated. This has led to restoration projects having to be discussed by the higher authorities and this requires a long-time. Because of that, the victims need to stay at the evacuation centres or stay at their relative's houses for a long period of time. This situation makes them uncomfortable and can affect their quality of life.	There are still shortcomings in terms of misunderstanding in implementing policies enacted by the government led to disaster management becomes ineffective despite the Directive No. 20 has been tabled.	NADMA should review the formulation of post-disaster policy, process and potential action plans required.
11. People with life-threatening and chronic disease, due to their particular needs, should be included in the design of policies and plans to manage their risks before, during and after disasters, including having access to life-saving services;	Flood victims are advised to bring their medications and keep in an emergency bag on evacuation.	No specific consideration given to special preparation for this category of flood victims.	Lack of awareness on the potential problems or situations which might occur..	Need to incorporate in flood disaster evacuation plans and facilities.
12. To encourage the adoption of	Evacuation plans are available	Negative attitudes of flood	Community is not regularly involved in	Future actions should involve the

Goal	Current Achievement	Gaps	Causes	Solutions
policies and programmes addressing disaster-induced human mobility to strengthen the resilience of affected people and that of host communities, in accordance with national laws and circumstances;	in case of flood disaster.	victims make relief management difficult.	flood disaster response exercises and are unaware of the logistical complexities. Many communities expect the government to take all the necessary action and do not become pro-active in disaster preparedness. Public apathy towards participation, with the attitude that Government will provide everything.	community in the planning and formulation of policies and make the implementation of comprehensive assistance in policy or programme planning and implementation more feasible.
13. To promote, as appropriate, the integration of disaster risk reduction considerations and measures in financial and fiscal instruments;	Annual budget allocated for disaster mitigation projects by government agencies. A National Disaster Fund is available. In 2015, the government made available additional funding for restoration and rehabilitation after the extreme 2014-15 floods. Special funding was also allocated for research on flood disaster response and reduction to universities. New developments need to apply the MSMA guidelines in order to mitigate and reduce flooding.	Previously the main focus was on the government response mechanism, especially for flood mitigation.	Flooding is considered a annually occurring event in many states; to be overcome using engineering solutions in urban areas as a post-development solution.	To identify any additional measures that need to be taken, together with legal provisions to provide penalties/incentives for appropriate development in potential flood risk areas.
14. To strengthen the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction	From the Stakeholder Forum For Incorporating Climate Resilience In The National Water Resources Policy Action Plans, 27-28 October 2014, organised by MyWP with DID with support by MyCWP, among the approaches proposed to be adopted are: <ul style="list-style-type: none"> Advocate the concept of Living with Flood and incorporate Integrated Flood Management (IFM) in development plans; Adopt Best Management 	Only intermittent projects are conducted using these approaches. Some challenges are: <ul style="list-style-type: none"> Floodplains are continuously being developed, Residents/stakeholder have high expectations and less tolerance towards flooding, Structural flood management costs are rising, and Non-structural approach 	This is mainly due to lack of capacity, financial allocation and human resources. Studies need to be carried out at basin level to evaluate flood risk potential under different scenarios of development and land-use patterns. The general public expect a top-down approach when it comes to disaster management.	Identify typical river basins as prototypes for resources management and development considerations. Conduct Training of Trainers to build the case of human resources who can contribute to awareness and training programmes at the community level. Engage with private sector in contributing towards these programmes as part of their CSR in involving local communities in managing their surroundings.

Goal	Current Achievement	Gaps	Causes	Solutions
	Practices/Plans; and • Stakeholder Engagement.	has not been well accepted (IFM, IWRM).		
15. To increase business resilience and protection of livelihoods and productive assets throughout the supply chains, ensure continuity of services and integrate disaster risk management into business models and practices;	Businesses plan based on traditional patterns of natural climate. As flooding is a regularly occurring event in several states, businesses are already aware of potential disruptions based on previous experience.	Expectation of variations in business and supply chains is based on traditional natural climate phenomena. When extreme or unusual weather patterns occur, businesses may be caught by surprise.	Lack of awareness and understanding on the impact of climate change induced weather extremes leading to flood and drought disasters on businesses.	To identify any additional measures that need to be taken, together with legal provisions to provide penalties/incentives for appropriate development in potential flood risk areas.
16. To strengthen the protection of livelihoods and productive assets, including livestock, working animals, tools and seeds;	Agricultural activities are arranged based on naturally occurring climate events in high risk flood areas. Government also provides financial support in case of disasters. For example, in the early 2015 flood event, affected farmers in the MADA granary area were awarded cash relief by the Government at RM1,009.00 per ha for a total of RM100.89 million.	This planning is based on traditionally natural flood events. The recent extreme floods of end 2014 is an indicator of lack of preparedness for unusual events.	Lack of awareness and understanding on climate change induced weather extremes leading to flood and drought disaster on agriculture.	To identify additional measures that need to be taken, for protection and appropriate agricultural development in potential flood risk areas. Agribusinesses need to understand the limitations of the water management systems also take on the responsibility for risk sharing and management. Develop planning and design criteria for nonpaddy crops, livestock and aquaculture to increase yields, stabilise production, flood resilience and sustainable development as part of climate actions.
17. To promote and integrate disaster risk management approaches throughout the tourism industry, given the often heavy reliance on tourism as a key economic driver.	The tourism industry calendar is organised around naturally occurring flood events in high risk areas.	This planning is based on traditionally natural flood events.	Lack of awareness and understanding on climate change induced flood disasters and their impact on tourism.	To identify any additional measures that need to be taken, for appropriate tourism development in potential flood disaster risk areas.

Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

The steady growth of disaster risk, including the increase of people and assets exposure, combined with the lessons learned from past disasters, indicates the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate disaster risk reduction in response preparedness and ensure that capacities are in place for effective response and recovery at all levels. Empowering women and persons with disabilities to publicly lead and promote gender equitable and universally accessible response, recovery, rehabilitation and reconstruction approaches is key. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to “Build Back Better”, including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.

Goal	Current Achievement	Gaps	Causes	Solutions
1. To prepare or review and periodically update disaster preparedness and contingency policies, plans and programmes with the involvement of the relevant institutions, considering climate change scenarios and their impact on disaster risk, and facilitating, as appropriate, the participation of all sectors and relevant stakeholders;	In December 2015, the government set up the National Disaster Management Agency (NADMA) to coordinate government agencies in tackling all disasters. NADMA is set up manage and coordinate efforts against disasters in the country, together with disaster management related agencies.	There is need to review lessons learnt and previous information on flood disaster operations in order to improve current action plans with the participation of all sectors and relevant stakeholders.	NADMA is newly formed with limited human resources but has been mandated to improved the disaster reduction and response mechanism.	Collaborate and assist NADMA in providing assistance, recommendations, training for improving the flood disaster risk management process through involvement of stakeholders.
2. To invest in, develop, maintain and strengthen people-centred multi-hazard, multisectoral forecasting and early warning systems, disaster risk and emergency communications mechanisms, social technologies and hazard-monitoring telecommunications systems; develop such systems through a participatory process; tailor them to the needs of users, including social and cultural requirements, in particular gender; promote the application of simple and low-cost early warning equipment and facilities; and broaden release channels for natural disaster early warning information;	There is a National Flood Forecasting and Warning System (NaFFWS) set-up with website for the general public. There are also a few mobile apps which link to these data. Since 1980, flood warning boards have been erected in the major river systems. These measures are part of the integrated flood forecasting and river monitoring system (iFFRM). Recently, there is a Malaysia/UK collaboration project involving public-private partnership is focussed on developing an Earth and Sea Observation System (EASOS). The foundation of the work based on satellite enhanced flood modelling capability together with specialist teams of weather and flood forecasting experts. The 18 month project began in December 2016 and the trial run is expected to be completed by May 2018. Members of academia have	For flash floods, there is little lead time is available for effective warning. The EASOS project's trial run is expected to be completed by May 2018. Previously the flood warning system was developed from a primarily technical and engineering perspective with limited stakeholder participation. In some instances warning systems suffered vandalism of equipment at stations; with complacency on part of community in response to flood warnings.	Flooding is considered a annually occurring event in many states; to be overcome using engineering solutions in urban areas as a post-development solution.	To evaluate the EASOS in operational mode. To improve the forecasting the warning system with multi-sectoral stakeholder participation in all aspects. The initiative of the DID in inviting for academia to participate in the development of the flood forecasting model in a good step in this direction. The DID has already began collaboration with MyCWP/MyWP, other NGOs and university in community-based training to empower local communities to improve readiness and build resilience. So we should continue with this collaboration and also bring on board NADMA.

Goal	Current Achievement	Gaps	Causes	Solutions
	been invited to provide input for the development of the new flood warning system. The meeting will be conducted in August 2017.			
3. To promote the resilience of new and existing critical infrastructure, including water, transportation and telecommunications infrastructure, educational facilities, hospitals and other health facilities, to ensure that they remain safe, effective and operational during and after disasters in order to provide life-saving and essential services;	Current engineering and building codes are available.	Guidelines on evaluating resilience of infrastructure to extreme flood events required. Flood has not been identified to be an event which requires a change in the building code.	Lack of experience in extreme flood events which are previously rare. Lack of awareness and understanding on the impact of building design on community resilience to flood disaster. The lack of a clear regulations linked to flood disaster management is another issue.	To evaluate resilience of critical infrastructure to flood events. Educate on the design guidelines used in other countries, e.g. FEMA, USA, for buildings located in a flood risk zone.
4. To establish community centres for the promotion of public awareness and the stockpiling of necessary materials to implement rescue and relief activities;	Flood relief centres and equipment stores are identified through the national disaster management mechanism.	The identified centres are insufficient in major/extreme events. There have been concerns of poor disaster relief management at the evacuation centre. This includes irregular, inadequate and slow assistance provided to victims.	Lack of experience in extreme flood events which previously affected small populations in low rural areas. Resources are stretched across several centres, there may be insufficient equipment and facilities and logistics may be compromised due to this.	Take into consideration extreme events and identify suitable measures to be taken. Involve communities in awareness of their relief centres and establish regular monitoring of facilities needed. Identify quality and standards required and make regular inspections at such centres, especially prior to the flood season.
5. To adopt public policies and actions that support the role of public service workers to establish or strengthen coordination and funding mechanisms and procedures for relief assistance and plan and prepare for post-disaster recovery and reconstruction;	Local councils and public service workers are integral in the flood response action plan.	Current plans are based on previous floods and may be insufficient in major/extreme events.	Lack of experience in extreme flood events which had not been experienced before under conditions of increased populations and urbanisation.	Take into consideration extreme events and identify suitable measures to be taken.
6. To train the existing workforce and voluntary workers in disaster response and strengthen technical and logistical capacities to ensure better response in emergencies;	Natural Disaster Relief Committee train the government departments/agencies and social organizations which provide shelter, rescue and food supplies in case of disaster to ensure that its machinery will	Training is normally conducted only prior to the expected flood season. Current plans are based on previous floods and may be insufficient in major/extreme events.	Lack of training experience in extreme flood events which had not been experienced before under conditions of increased populations and urbanisation.	Increase training scope to take into consideration extreme events and identify suitable measures to be taken.

Goal	Current Achievement	Gaps	Causes	Solutions
	run smoothly normally before the Northeast monsoon at the end of the year.			
7. To ensure the continuity of operations and planning, including social and economic recovery, and the provision of basic services in the post-disaster phase;	<p>The National Security Council's Emergency Control Centre (ECC) that acts as a central command and control facility to manage any public threats or emergency. It is responsible for carrying out the activities for the entire phases of disaster: mitigation, preparedness, response and rehabilitation that functions at a strategic and tactical level in an emergency situation.</p> <p>After the extreme floods at the end of 2014, in January 2015, the Prime Minister of Malaysia allocated a budget of RM893 million for flood mitigation works, RM800 million as initial allocation for the repair and reconstruction of basic infrastructure like schools, hospitals, roads, and bridges, RM500 million for rehabilitation works and welfare programmes, and RM500 million special relief facility for SME loan financing.</p>	Current plans are based on previous floods and may be insufficient in major/extreme events.	The complexity and size of the disaster will determine which level the disaster will be placed, together with the responsible agencies. Lack of experience in extreme flood events which previously affected small populations in low rural areas.	Increase scope of operations to take into consideration extreme events and identify suitable measures to be taken.
8. To promote regular disaster preparedness, response and recovery exercises, including evacuation drills, training and the establishment of area-based support systems, with a view to ensuring rapid and effective response to disasters and related displacement, including access to safe shelter, essential food and non-food relief supplies, as appropriate to local	Under Directive No. 20, agencies involved in the flood disaster management lifecycle are to be responsible for its own implementation and execution of roles and activities. DID has published Circular No. 2/2003 "Guidelines for Management of Flood Disaster during Monsoon Season and Flash Floods" which is to	<p>Training is normally conducted only prior to the expected flood season.</p> <p>Current plans are based on previous floods and may be insufficient in major/extreme events.</p>	The complexity and size of the disaster will determine which level the disaster will be placed, together with the responsible agencies.	<p>Increase training scope to take into consideration extreme events and identify suitable measures to be taken.</p> <p>Ensure regular training schedule for preparedness.</p>

Goal	Current Achievement	Gaps	Causes	Solutions
needs;	coordinate the preparation of flood operation at federal, state and district levels.			
9. To promote the cooperation of diverse institutions, multiple authorities and related stakeholders at all levels, including affected communities and business, in view of the complex and costly nature of post-disaster reconstruction, under the coordination of national authorities;	The main functions of the Disaster Management and Relief Committee (DMRC) includes establishing a recovery systems for the community to return to its normalcy. Agencies are identified at all levels of government to be directly involved in the post-disaster reconstruction.	Primarily government and government-related agencies are those involved in post-disaster recovery. These mainly concentrate on the physical infrastructure recovery. Issues related to socio-economic aspects are additional.	Flood disaster management has been mainly considered as a technical and engineering problem and little attention has been given to psychological, social and community aspects of rehabilitation.	Take into consideration extreme events which may become more important as a result of climate change; and include wider group of stakeholders in awareness, training, and preparation for flood disaster management.
10. To promote the incorporation of disaster risk management into post-disaster recovery and rehabilitation processes, facilitate the link between relief, rehabilitation and development, use opportunities during the recovery phase to develop capacities that reduce disaster risk in the short, medium and long term, including through the development of measures such as land-use planning, structural standards improvement and the sharing of expertise, knowledge, post-disaster reviews and lessons learned and integrate post-disaster reconstruction into the economic and social sustainable development of affected areas. This should also apply to temporary settlements for persons displaced by disasters;	Flood disaster evaluation and flood mitigation studies are conducted after unusual events in order to develop flood mitigation measures including development of flood control structures. After the extreme flood at the end of 2014, the government allocated special funding was given to reconstruct and rehabilitate areas affected as well as conduct research on all aspects of flood disaster management.	An important gap identified as a result of the 2014 extreme floods was the lack of information on illegal land use and the lack of awareness and understanding of the community on the consequences of inappropriate land use.	Previous experiences of floods did not encounter such a problem affecting a sizeable number of people.	NADMA is expected to use existing disaster management mechanisms while it is in the process of improving procedures in line with global best practices. Include all sectors at all levels (communities and businesses) in the whole cycle of operations for flood disaster management. Action plans for post-flood recovery options should be developed.
11. To develop guidance for preparedness for disaster reconstruction, such as on land-use planning and structural standards improvement, including by learning from the recovery and reconstruction programmes over the decade since the adoption of the	The National Security Council has developed Operation Procedure No.29 for the organization of flood relief and operations. DID has published Circular No. 2/2003 "Guidelines for Management of Flood Disaster	Circulars are normally internal documents, not know or generally available to the public.	Government Circulars are intended for internal consumption for operational implementation.	Guidelines are required for different levels of society and different communities an businesses to also make them aware and more knowledgeable about flood disaster management and preparedness.

Goal	Current Achievement	Gaps	Causes	Solutions
Hyogo Framework for Action, and exchanging experiences, knowledge and lessons learned;	during Monsoon Season and Flash Floods” to coordinate the preparation of flood operation at federal, state and district levels.			
12. To consider the relocation of public facilities and infrastructures to areas outside the risk range, wherever possible, in the post-disaster reconstruction process, in consultation with the people concerned, as appropriate;	Improvement of facilities, upgrading works and flood mitigation structures are considered in reconstruction. Public consultation is sometimes conducted.	Public consultation is infrequently conducted, often in the form of targeted focus groups of formal local leaders.	The general public/local community is not considered as an important source for consultation due to their incomplete awareness, understanding, expertise in flood disaster management. Fear of blame accusations being placed on government agencies since there is a belief that all disaster response is the responsibility of the government.	Increase level of awareness, understanding, and knowledge of local communities potentially at risk or affected by flood disaster. This can include sharing of experiences, discussion of issues and problems in flood disaster management. There is a need to develop a civil society culture of self-help and resilience building in the face of uncertainties due to disasters resulting from climate change impacts.
13. To strengthen the capacity of local authorities to evacuate persons living in disaster-prone areas;	Local Authorities are directly involved in flood disaster management at their district level.	Infrequency of training may result in unpreparedness on the part of some local authority officials.	Only areas of frequent flooding are given focus and obtain experience in flood management.	Sharing of experiences and participation across districts may enhance capacity of local authority officials.
14. To establish a mechanism of case registry and a database of mortality caused by disaster in order to improve the prevention of morbidity and mortality;	The National Disaster Management System (NDMS) is able to support the disaster management at a federal level by providing information management that includes data analysis, historical data, activity monitoring and action status. Information on mortality of flood victims are available based on specific flood events.	The information is considered confidential information.	The NDMS is under the National Security Council management. There is a fear that incorrect, sensational, exaggerated news and rumours may result if the information is released prior to verification or taken out of context.	NADMA can act as the central agency to be responsible for the database as part of its operation and planning process. Comparative analysis of the data and information can provide better approaches for planning and flood disaster response management.
15. To enhance recovery schemes to provide psychosocial support and mental health services for all people in need;	Recovery schemes provide financial and social assistance for flood victims.	Recovery schemes do not provide psychological support for victims. Poor disaster relief management of victims' psychological trauma at the evacuation centre and post event.	Lack of awareness on the need for such support for victims. Flood disaster management has been mainly considered as a technical and engineering problem and little attention has been given to psychological, social and community aspects of rehabilitation.	Provide specialised training required, especially on psychological trauma and post-disaster rehabilitation.

Goal	Current Achievement	Gaps	Causes	Solutions
16. To review and strengthen, as appropriate, national laws and procedures on international cooperation, based on the Guidelines for the Domestic Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance.	DID has published Circular No. 2/2003 “Guidelines for Management of Flood Disaster during Monsoon Season and Flash Floods” which is to coordinate the preparation of flood operation at federal, state and district levels. NADMA is set up manage and coordinate efforts against disasters in the country, together with disaster management related agencies, such as the Malaysian Armed Forces, police, Malaysian Civil Defence Department, Fire and Rescue Department, Social Welfare Department.	NADMA has only recently been set up. NADMA has small staff strength as it has still a new agency and it will take some time to implement new projects.	Legal aspects had not been previously considered to an important consideration in flood management.	NADMA has to review the current legal provisions related to disaster management mechanism. Interact with NADMA to offer collaboration and assistance.

VOLUME 2: INPUTS TO MALAYSIAN NATIONAL ADAPTATION PLAN

Mr. Gurmit Singh

29 Dec. 2018

MyCWP REPORT OF SURVEY

1. INTRODUCTION

After getting the consent from MESTECC, a multi-stakeholder analysis and policy recommendations on water related hazard adaptation efforts / programmes for the proposed National Adaptation Plan (NAP) that is being prepared by the new Ministry of Energy, Technology, Science, Climate Change and Environment was conducted among MyCWP partners through an electronic survey in July and November.

Replies from gec, cetdem, iwk, uniten, upsi, daya, mso, mancid, & mof were received.

2. SUMMARY OF RESPONSES

1. *What is your analysis of the current water related hazard adaptation efforts in the country?*

Flood hazard & depletion of topsoil in upstream catchment areas

Sediment pollution of waterways

General Malaysian apathy about water conservation

Integrated dam safety management & risk reduction

Interactive dam safety decision support system for flood disaster reduction

Real time flash flood forecasting

Integrated community based disaster preparedness & response planning

Better understanding of local flood risk potential as well as carrying capacity of waterways

Lack of enforcement and too many grey areas in water quality management

Long term impacts need to be better predicted

- # Polluted surface & ground water due to land development
- # Impact of flooding on sewerage facilities
- # Improve preparedness
- # Incorporate hazard maps in land use planning/ development
- # Poor coordination in adaptation measures between state & national levels
- # Little done to restore carrying capacities of waterways
- # Water catchments impaired and poor maintenance of water outfalls
- # Coping with water shortfalls still adhoc
- # Efforts not spread to local level
- # Lack of awareness has prevented relevant stakeholder contributions
- # Illegal logging contributing to floods in rural areas
- # People do not care much
- # Government efforts not serious
- # Inadequate funding
- # Poor understanding of CC issues
- # Inadequate capacity building

2. *What can be done to improve existing programmes?*

- # ESCPs to be mandatory for all land clearing
- # Land Conservation Act to be reactivated & applied esp. for hill lands
- # Water quality at source should be enforced
- # Form key stakeholder committee
- # Increase research funding for water-related hazards
- # Timely and accurate flood forecasting

- # Reduce processing time for flood modeling
- # Engage grassroots to address water hazards
- # Community based CC resilience promoted
- # Shift to water demand management & factor in salinization of coastal rivers
- # Better water education
- # Establish integrated flood management plan
- # Flood forecast system
- # Sewerage sector to adapt to floods at both planning & operational stages
- # Focused research in disaster mgmt.
- # More involvement of planners in disaster mgmt. planning
- # More effective implementation of IWRM at ALL levels
- # Major attempts in educating communities and meaningful stakeholder involvement
- # Promote more public involvement
- # Improve clarity of past & proposed initiatives undertaken at all levels
- # Better enforcement of regulations
- # Clarity of govt. policy & implementation
- # Adequate public funds for CC adaptation
- # Improve public understanding & build capacity in CC issues
- # Strengthen implementation by all relevant agencies

3. *What should be the priority areas to be included in the NAP?*

- . # Non-point source pollution
- # Erosion & sedimentation control

- # Advocate plants that can resist both floods & droughts
- # Severely limit paved/tarred areas & high rise buildings in urban areas
- # Real time flood forecasting
- # Flood evaluation and dam safety
- # Public awareness & education for water related hazards
- # Emphasize more immediate integrated mitigation
- # Highlight scope of water sustainability & disaster mgmt.
- # Shift to DSM & alternate water supply
- # Effective consultation & engagement with NGOs at all levels & all the time
- # Awareness on water usage
- # Financial support for sewerage sector
- # Revise MSMA
- # Sewage water safety plan
- # Capacity building
- # Build better
- # Effective coordination
- # Preventive planning
- # Meaningful stakeholder consultation
- # Adequate resources
- # Disseminate information to relevant stakeholders
- # Flood mitigation
- # Education at all levels
- # Action plans from the public to reduce CC impacts

Institution strengthening.

3. RECOMMENDATIONS TO MSTECC

From the wide range of issues raised by the stakeholders, MESTECC needs to address the major shortfalls in the current adaptation measures i.e. poor understanding and awareness of CC among many stakeholders, poor enforcement of regulations and official instructions, limited integrated community based disaster preparedness & response planning, poor coordination in adaptation measures between state & national levels, polluted surface & ground water due to land development, impaired water catchments, and poor maintenance of water outfalls.

In order to improve current weak adaptation measures, the NAP should make ESCPs mandatory for all land clearing, ensure that the Land Conservation Act is reactivated & applied esp. for hill lands, enforce water quality at source, form key stakeholder committees, shift to water demand management & factor in salinization of coastal rivers, improve water education, establish integrated flood management plans, have more effective implementation of IWRM at ALL levels, make major attempts in educating communities and meaningful stakeholder involvement, promote more public involvement, ensure adequate public funds for CC adaptation, improve public understanding & build capacity in CC issues, and strengthen implementation by all relevant agencies.

NAP should prioritise non-point source pollution, erosion & sedimentation control, public awareness & education for water related hazards, emphasize more immediate integrated

mitigation, highlight scope of water sustainability & disaster mgmt., shift to DSM & alternate water supply, effective consultation & engagement with NGOs at all levels & all the time, education at all levels, action plans from the public to reduce CC impacts, and institution strengthening.

MyCWP is available to participate in the finalization of the NAP and offers to organize a Seminar with MESTECC in 2019 on these recommendations.

Volume 3: Preliminary assessment of financial investments for climate change mitigation and adaptation