CONSULTANCY MISSION REPORT
FOR
MALAYSIA

By

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As part of the project on Synergized Standard Operating Procedures (SSOP) for Coastal Multi-Hazards Early Warning System, three expert consultants, one on meteorology, one on hydrology, and one on disaster risk reduction, conducted a highly successful two-day mission to Malaysia on 28-29 August 2014. The main purpose of the mission was to collect and compile data, information, examples, and diagrams on standard operating procedures (SOPs), good practices, gaps and needs, and recommendations for inclusion in the Manual on Synergized Standard Operating Procedures (SSOP) for Coastal Multi-Hazard Early Warning System which will meet the needs of the 13 beneficiary countries involved in the Project.

Participants in the Meetings at the Malaysian Meteorological Department (MMD)
(Mr Alui BAHARI, Deputy Director-General (Weather & Climate) of MMD (center), with the Experts (seated from left), Dr Amir Ali KHAN (India), Mr Abdul MAJID (Pakistan) and Dr Tokiyoshi TOYA (Japan) and Participants from MMD, the Department of Irrigation and Drainage,
the National Security Council and the Social Welfare Department)

Acknowledgments

This consultancy mission was conducted as part of Activity 1.3 of the Project - Synergized Standard Operating Procedures (SSOP) for Coastal Multi-Hazards Early Warning System. The lead organizations for the project are: the ESCAP/WMO Typhoon Committee; and the WMO/ESCAP Panel on Tropical Cyclones in association with a wide cross section of partner agencies. Very kind appreciation is expressed to the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries which funded this project; to the Malaysian Meteorological Department (MMD) and other governmental and non-governmental organizations for their vital assistance, support, and active participation in the successful working-level meetings; and to the Typhoon Committee Secretariat who provided excellent and very time-consuming support, coordination, detailed arrangements, and insights for the mission.

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1. Introduction

1.1 The Economic and Social Commission for Asia and the Pacific (ESCAP) approved a submitted project *Synergized Standard Operating Procedures (SSOP) for Coastal Multi-Hazards Early Warning System* and funded it through the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries. The ESCAP/World Meteorological Organization (WMO) Typhoon Committee (TC) and the WMO/ESCAP Panel on Tropical Cyclones (PTC) in cooperation with other agencies had recognized a strong need to create synergies in early warning systems among different types of coastal hazards, including tsunami, storm surge, high tide, high wave, strong wind, flood and sediment disasters, by reviewing relevant existing Standard Operating Procedures (SOPs).

2. SSOP Project Overview

2.1 The goal of the SSOP project is to promote community resilience to coastal multi-hazards through effective SOPs for multi-hazards Early Warning System (EWS). The project is collaboration with multiple agencies and organizations. It involves 13 beneficiary countries in TC and PTC regions: Bangladesh; Cambodia; China; India; Lao People's Democratic Republic; Malaysia; Maldives; Myanmar; Pakistan; Philippines; Sri Lanka; Thailand; and Viet Nam. The designated target groups/organizations include National Meteorological and Hydrological Services (NMHSs); National Tsunami Warning Centers; and National Disaster Management Offices (NDMOs) in TC and PTC Member countries.

2.2 Among the planned activities under the project, Activity 1 is to collect, review, analyze, and synergize existing SOPs for coastal multi-hazards EWS in TC and PTC Members and develop a Manual of Synergized SOPs. The third item in Activity 1 is to synergize existing SOPs and develop additional SOPs as needed to meet identified gaps and needs and compile the SSOP Manual for coastal multi-hazards EWS, mainly focusing on the hydro-meteorological aspect, to meet the needs of diverse users, including decision makers, early warning issuers, media, researchers and the public at community level.

2.3 To complete Activity 1.3 and to meet the success indicator, further to the three in-country pilot workshops already carried out in October 2013, two teams of consultants visited 3 targeted countries each in the Panel on Tropical Cyclones region: Maldives, Myanmar and Sri Lanka, and in the Typhoon Committee region: Cambodia, Malaysia and Viet Nam. The missions to the PTC region countries were conducted from 4 to 11 August 2014 and to the TC region countries from 28 August to 5 September 2014.

3. Purposes of the Mission Visits

3.1 The main purposes of the mission visits were:

(a) To review existing coastal multi-hazards EWS SOPs of hydro-meteorological services, disaster management agencies, media, elected officials, and others from national to district to local levels;

(b) To identify good practices, gaps and needs, and recommendations for internal and cross-cutting SOPs; and

(c) To compile data, information, examples and diagrams collected on SOPs good practices, gaps and needs, and recommendations for inclusion in the Manual on Synergized Standard Operating Procedures (SSOP) for Coastal Multi-Hazard Early Warning System which will meet the needs of the 13 beneficiary countries involved in the Project.

4. Mission Date and Team Members

4.1 The consultancy mission to Malaysia was carried out on 28 and 29 August 2014 by three consultants: on Meteorology - Dr Tokiyoshi Toya (Japan), Former Regional Director for Asia and the South-West Pacific, WMO; on Hydrology - Mr Abdul Majid (Pakistan), Former Director of the National Flood Forecasting Bureau, Pakistan; and on Disaster Risk Reduction (DRR) - Dr Amir Ali Khan (India).

5. Meeting Programme Overview

5.1 The programme for the two-day working-level meetings for Malaysia was developed, as given below, in collaboration with members/participants from Malaysia, the Project Manager, and the Typhoon Committee Secretariat (TCS), in order to identify: specific existing coastal hazards-related MOUs/SOPs which could be synergized; those which need improvement; and specific areas both technical and non-technical where additional coastal hazards-related SOPs are needed, and to collect recommendations for the SSOP Manual.

Day 1

Session 1: Plenary Meeting with all the participants
(for introduction to the SSOP project and mission purposes)
Session 2a: Breakout/Parallel Meeting with warning services participants
Session 2b: Breakout/Parallel Meeting with DRR participants
Session 3a: Breakout/Parallel Meeting with national and local decision makers participants
Session 3b: Breakout/Parallel Meeting with media participants

Day 2

Session 1: Plenary Meeting on further clarification and Summary of Breakout/Parallel Meetings
Session 2: Discussion on the recommendations for the SSOP Manual
Session 3: Summary of the Meetings and Results

5.2 The Plenary Meeting was opened by Mr Alui Bahari, Deputy Director-General (Weather & Climate), Malaysian Meteorological Department (MMD, also called MetMalaysia) at 09.30 a.m. on 28 August 2014 with a brief introduction of the consultants and participants and of the SSOP project. The list of participants is given in Appendix I.

5.3 On behalf of the mission team as well as the Project Manager and TCS, Dr Toya provided presentations on: the Overview of the SSOP project; the Meteorological insight into SOPs; and Tentative work programme and expectations from participants, with special emphasis on the importance of SOPs.

5.4 Breakout Meetings were organized to facilitate the discussions in specific areas, including meteorological and hydrological warning services; disaster risk management, media, and national and local decision makers.

5.5 Discussions were made, based on the questionnaire response on the existing EWS and SOPs in Malaysia, on the role of SOPs in the integration, collaboration, and coordination needed by the various agencies/organizations, and on what does the SSOP Manual need to contain to help integration, collaboration and coordination.

5.6 The Questionnaire was completed through the discussions for clarification and with detailed specific information. The completed Questionnaire Response is given in Appendix II.

6. Key Findings

6.1 Early Warning System

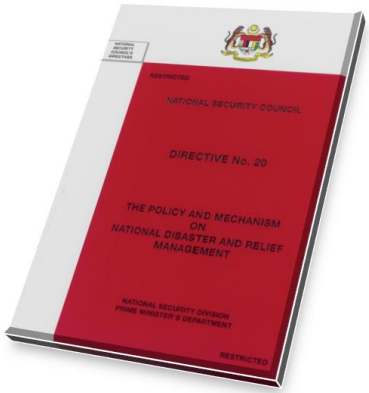
6.1.1 Existing Early Warning System

Legal Framework for Disaster Management in Malaysia

6.1.1 The National Security Council (NSC) under the Prime Minister's Department is the nodal agency to manage and coordinate all activities related to disaster management at national level in Malaysia. NSC is involved in the following activities related to disaster management:

- It formulates, implements and reviews disaster management policy and strategy;
- It supervises the humanitarian assistance activities after disasters;
- It manages disaster relief fund;
- It mobilizes Special Malaysia Disaster Assistance and Rescue Teams;
- It carries out post-disaster assessment;
- It coordinates disaster awareness programme;
- It monitors disaster risk reduction initiative; and
- It coordinates disaster management exercise.

6.1.2 The National Security Council's "***Directive No. 20: The Policy and Mechanism on National Disaster Management and Relief***" is the main legislative instrument available at national level in Malaysia to meet the challenge of disaster management. The Directive was first issued by the National Security Council in May 1997, which has been reviewed in March 2012.



NSC Directive No. 20

6.1.3 The NSC Directive No. 20 outlines policy and mechanism on disaster and relief management on land. The Directive follows a holistic, comprehensive and integrated disaster management approach which encompasses all stages of disaster management at pre-disaster, during disaster (emergency phase) and post disaster management stages and by involving all stakeholders. The Directive provides guidelines on the management of disasters and defines the roles and responsibilities of different agencies involved in disaster management. The Directive tries to create systematic coordination among agencies involved in disaster management as well as relief and rehabilitation.

Meteorological Aspects

6.1.4 A multi-hazard Early Warning System was established in MMD on 12 January 2005 following the Indian Ocean Tsunami occurred in December 2004. The system collects and provides advisory and warning information on: severe weather; flood; earthquake and tsunami; haze (mainly due to forest fires); and volcanic eruption.

Multi-Hazard Early Warning System in Malaysia

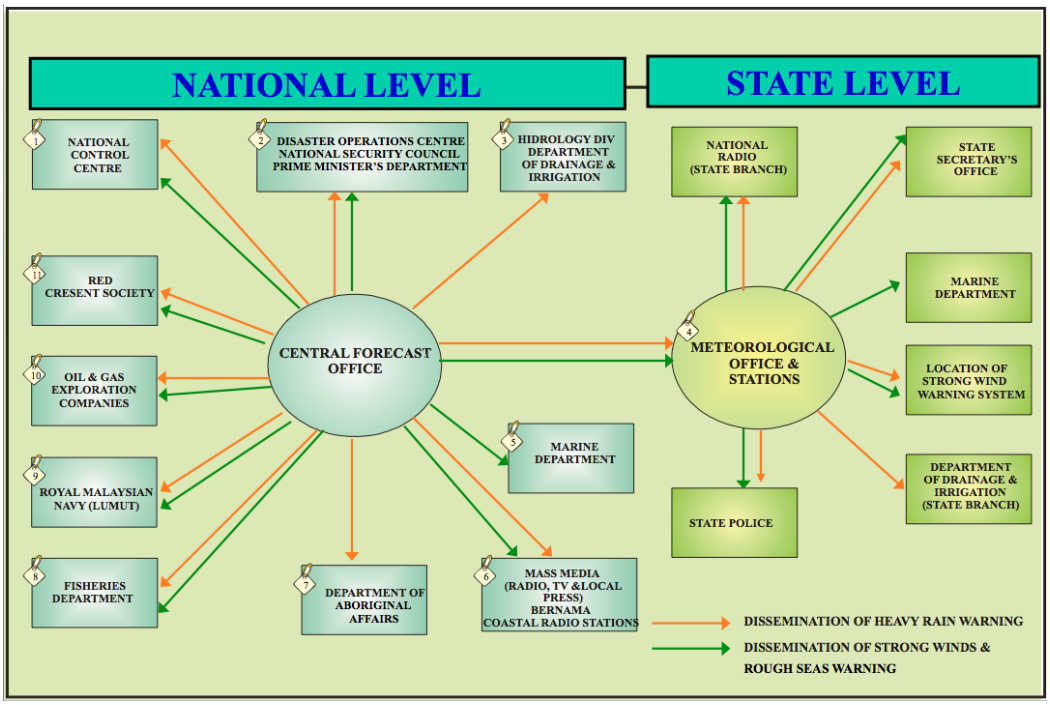
6.1.5 The monitoring of severe weather is being made by MMD (MetMalaysia) with 45 principal meteorological stations, 8 upper-air stations, 35 coastal and weather camera stations, 12 weather radar stations and 1 mobile weather radar, 1 satellite ground station and 339 auxiliary stations (142 AWSs, 39 climatological stations and 159 rainfall stations). The collected data is shared with other agencies via the MMD Website and Intranet (e-CUACA).

6.1.6 Potential Tropical Cyclones are monitored based on the analyses of satellite imagery (MTSAT and FY), wind charts, NWP model (e.g., MMD-WRF, MMD-MM5, ECMWF, GFS, NAVGEM, etc.) products and information from tropical cyclone monitoring centers such as the RSMC Tokyo-Typhoon Center, the Joint Typhoon Warning Center (JTWC: Hawaii) and the

RSMC - Tropical Cyclones New Delhi. A Tropical Cyclone Warning is issued for tropical depression/tropical storm/typhoon in the Malaysian Exclusive Economic Zone (EEZ) or if the TC is forecast to enter Malaysia EEZ within 24 hours. A Tropical Cyclone Advisory is issued for tropical cyclones outside the Malaysian EEZ but within the area bounded by 0-30ºN and 90-130ºE.

6.1.7 The advisory and warning services for severe weather are made for heavy rain, strong winds, rough seas and low visibility. An example of the warning on strong winds and rough seas induced by Typhoon *Matmo* (in July 2014) is given in Appendix III.1. Other examples of Advisory/Warning related to Tropical Cyclone and Heavy Rain Warning are given in Appendices III.2 and III.3, respectively. The warnings include the wording indicating the time, places and potential threat to Malaysia.

6.1.8 The dissemination of advisories and warnings are made from the providers (MMD for heavy rain, strong wind, tropical cyclone and storm surge; the Department of Irrigation and Drainage (DID) for Riverine and flash floods) to: the National Control Center; NSC Disaster Operations Center, DID, Meteorological Offices/Stations at the State level; Marine Department; Department of Aboriginal Affairs; Fisheries Department; Royal Malaysian Navy; Red Crescent Society; Oil & Gas Exploration Companies; and Mass Media by MMD Webpage (http://www.met.gov.my); e-mail; facsimile; SMS; Social Media Network (e.g., Facebook (www.facebook.com/malaysiamet) and Twitter (twitter.com/malaysianmet) for subscribed users); and TV crawler. At the State level, the advisories and warnings are disseminated from the State-level Meteorological Office/Station to: the State Secretary's Office; Marine Department; DID State Branch; State Police; locations of severe weather warning system; and State Branch of the National Radio (*see below the dissemination diagram*).



Dissemination of Severe Weather Warning (in Peninsular Malaysia)

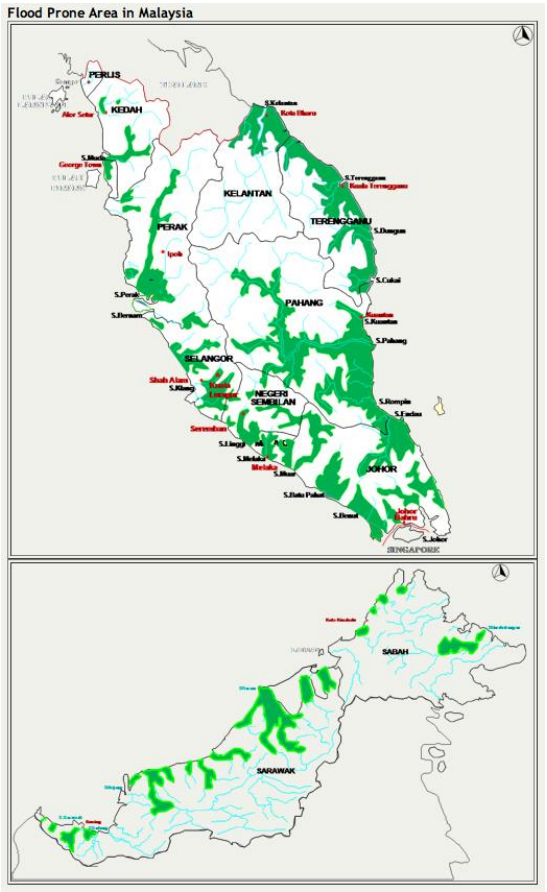
6.1.9 During a hazardous event, warning service agencies, disaster risk management bodies and the media maintain active communication using a specific government communication system, i.e., GIRN (Government Integrated Radio Network).

6.1.10 Part of dissemination/communication measures (phones and social media) is two-way and interactive for confirmation that warnings have been received at the community level. So far, the system has worked well.

6.1.11 To ensure that the warning is adequate and reliable, MMD conducts a regular maintenance and performance measurement as stipulated in ISO implementation. The MMD warning services are routinely verified by the Internal Auditor at least once a year followed by the External Auditor, which is from the national organization of standardization and quality in Malaysia.

Hydrological Aspects

6.1.12 Malaysia has a total of 189 rivers, out of which 41 are the major rivers. Floods are the most common natural hazard in Malaysia. Flood forecasting has been assigned to the Department of Irrigation and Drainage (DID) on the basis of the National Security Council (NSC) Directive No 20. There are 15 dams over the major rivers mostly under the control of hydropower companies, which operate the dams according to their own needs. Thus the dams play no role in flood mitigation. Floods occur on account of heavy rains during the period of Northeast Monsoon activity. Flood season in Malaysia is from mid-October to early February. East coast is the most flood prone region which is flooded almost every year.



6.1.13 Since 1971, DID has been providing flood forecasting and warning services to the public, based upon the weather forecasts and the rainfall data provided by MMD, and the data and the data of 430 rain gauges and 318 river water stations. The data is received through the telemetric system. In addition, 17 cameras are also installed for flood monitoring.

6.1.14 DID has both rainfall-runoff and flood routing models (called NAM & BDM models). Input into the rainfall-runoff model is the additional rainfall data received from MMD through on line system and the upstream water level data monitored through a telemetric river monitoring system and communicated to DID via satellite (see Diagram of Telemetry System in Appendix V). Until now the flood forecast is not communicated and only when the water level on any one of the river monitoring points rises to what is called the "Warning level" the information is passed on to the National Security Council and the State which is likely to be

affected by the incoming flood wave. Effort is being made to use the forecast rainfall in order to increase the forecast lead-time. Reliability of the rainfall forecast is however not up to the mark. Flood forecasts are not issued on a daily basis but are issued only when actual flood level rises to the warning stage at any one of the river gauge monitoring points on the river.

6.1.15 Flood forecast/warning is provided with the overlapping communication system, i.e., via the Internet (ref. the *Info-Banjir* Webpage (http://publicinfobanjir.water.gov.my)) and short message system (SMS) to the relevant government agencies, such as Police, Army, MMD, Civil Defense Department and National Security Division at the Prime Minister's Department, and to the media. This way the warning reception is firmly ensured. The diagram for dissemination of river level information is given below. The link between MMD and DID is on "as required" basis. DID does not have a round-the-clock working procedure and gets linked with MMD whenever required (on account of river rise to the warning stage).

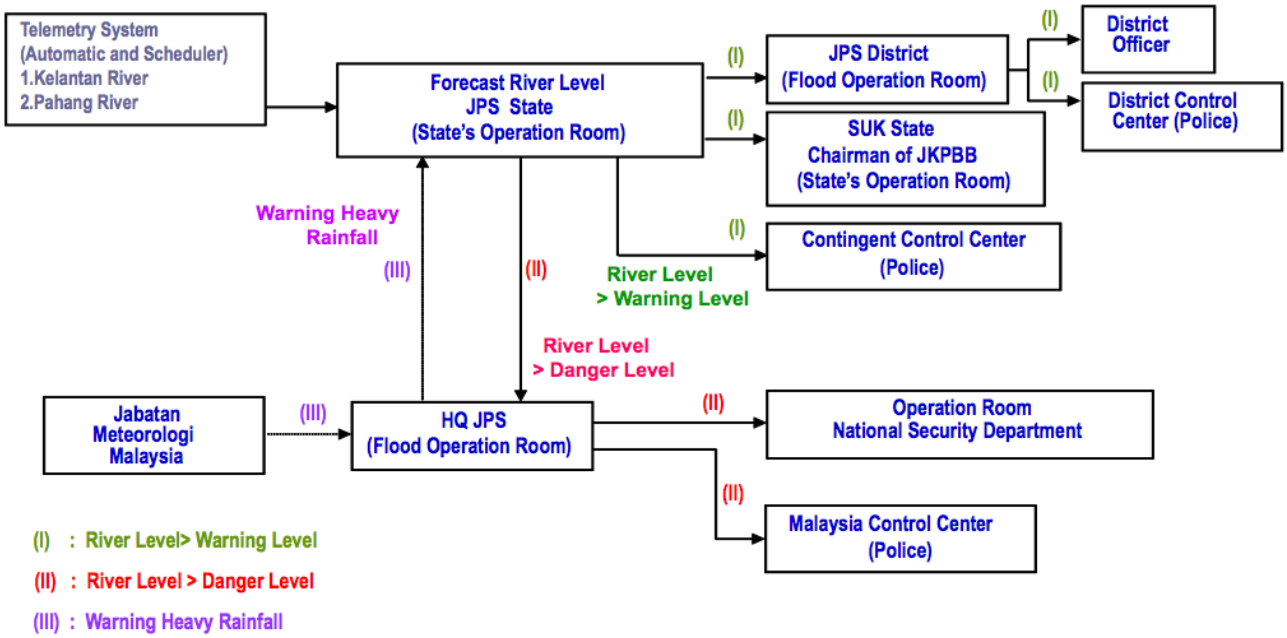


Diagram for Dissemination of River Level Information

6.1.16 Examples of Flood Warning are given in Appendix III.4.

Pre-flood Season Preparations

6.1.17 Under the NSC Directive No. 20, DID carries out the river system survey prior to the onset of the flood season for the identification and thus the execution of the necessary flood protection works as a measure of flood safety. One of such measures being executed is the preparation of flood hazard maps for 20-, 50- and 100-year return periods for the major rivers. Hydropower companies controlling the dams have their own SOPs relating to flood operations. Necessary pre-flood measures relating to the dam safety are taken by them.

Actions during the flood

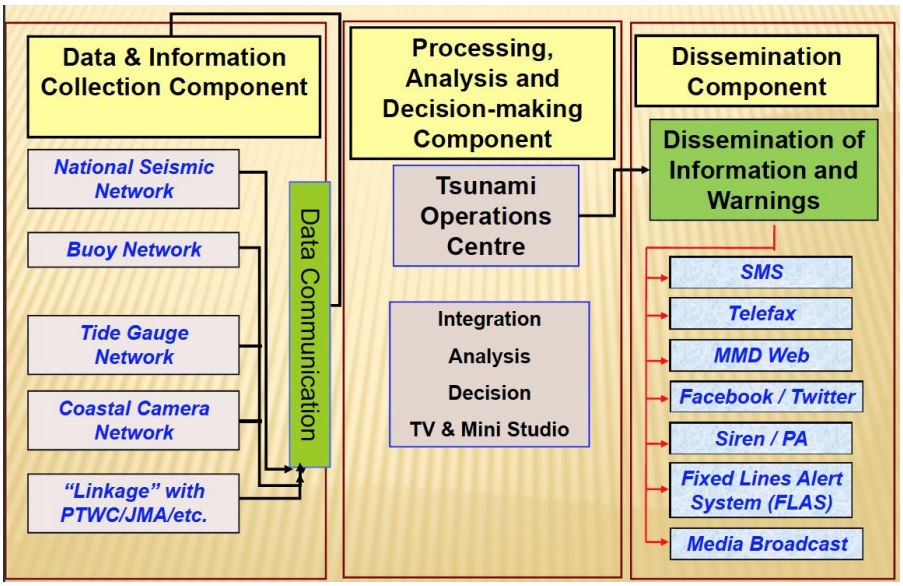
6.1.18 Upon receipt of the warning, NSC activates the actions relating to public information, evacuation, relief, rescue, etc. Army, Police, Fire Risk and Civil Defense Departments are mobilized for this purpose. A committee of all these departments is formed headed by the Police Department to carry out the various tasks related to the flood emergency.

Post-flood Measures

6.1.19 There is no laid-down SOP with DID defining actions to be taken after the flood occurs. NSC issues the necessary instructions for this purpose to all flood-related agencies. Flood damage assessment is made and post flood reconstruction measures are taken by NSC. DID also carries out the studies to check the performance of flood forecast system.

Tsunami Aspects

6.1.20 A diagram of the Malaysian Tsunami Early Warning System is shown below.



Following the Indian Ocean tsunami on 26 December 2004, the National Earthquake and Tsunami Center and the National Weather Center were combined to form a Multi-hazard Early Warning Center in January 2005. Presently, it is located at the MMD headquarters.

6.1.21 The monitoring of earthquake is made with the national seismic network composed of 17 seismic stations in Malaysia, 25 international seismic stations, and the Seismic Data Processing and Analyzing System. Seismic data is transmitted from the seismic stations to MMD headquarters via the Very Small Aperture Terminal (VSAT) satellite communication system.

6.1.22 The monitoring of the sea level (for tsunami) is carried out by the tide gauge network composed of 17 tide gauge stations throughout Malaysia and by collecting sea-level data from 71

oversea tidal stations in near-real time via WMO/GTS circuit. MMD also deployed a Tsunami Buoy in South China Sea with seabed-mounted tsunami detection modules. Data from the buoys are transmitted via satellite communication system (INMARSAT) through an antenna receiver installed at the MMD headquarters. MMD also collects sea-level data from 18 oversea NOAA DART buoys in near-real time via WMO/GTS circuit. To monitor high waves or unusual sea conditions, 18 coastal cameras are deployed.

6.1.23 MMD receives tsunami advisory services from the PTWC Honolulu, JMA Tokyo and RTSPs (Australia, India and Indonesia) via GTS for tsunamis that occur in the Pacific, South China Sea and Indian Ocean areas.

6.1.24 For tsunami warning decision and dissemination, MMD employs the Decision and Dissemination Support Systems (DADS) which generates relevant bulletins to be disseminated through email, text messaging (SMS) and facsimile to: NSC, the Ministry of Science, Technology and Innovation (MOSTI), Central and State Meteorological Departments, Malaysia Control Center (Police), media, State Governments and Disaster Teams; and to the general public through the MMD (MetMalaysia) Website (including Facebook and Twitter), Fixed Line Alert System (FLAS) and Siren Alert System.

6.1.25 An example of Tsunami Warning is given in Appendix III.5 and some examples of relevant SMS message, TV crawler and Press Statement are given in Appendix III.6.

Disaster Risk Reduction (DRR) Aspects

6.1.26 The NSC Directive No. 20 provides a definition of disaster as "an incident which occurs in a sudden manner and complex in its nature and that causes losses of lives, damages to property or natural environment and bring a deep effect to local activities. Such incident needs a management that involving extensive, resources, equipment, skills and man power from many agencies with an effective coordination, which is possibly demanding a complex action and would take a long time".

6.1.27 To carry out the responsibilities assigned to NSC, there are Disaster Management and Relief Committees (DMRC) established at the Federal, States and Districts levels to coordinate disaster management activities. The Federal-level Disaster Management and Relief Committee is chaired by the Deputy Prime Minister/Minister in the Prime Minister's Department, while the State- and District-level Committees are chaired by the State- and District-level officials, respectively. The main functions of DMRC are as follows:

- To formulate policies and strategies at the Federal level and implementation of such policies at the State and District levels;
- To ensure sound coordination among the agencies involved in management of disaster events;
- To determine the principal emergency agencies;
- To activate the Disaster Operation Control Center at District, State or Federal level;
- To coordinate and mobilize resources and logistics available both from government agencies and the private sector;

- To coordinate assistance and rehabilitation to disaster victims; and
- To carry out post disaster assessment.

6.1.28 Main agencies involved in disaster management in Malaysia include:

- The Royal Malaysian Police;
- The Royal Malaysian Army;
- Special Malaysia Disaster Assistance and Rescue Team (SMART);
- Malaysian Meteorological Department (MMD);
- Department of Irrigation and Drainage (DID);
- The Public Works Department (PWD);
- Social Welfare Department;
- The Local Authority;
- Non-Governmental Organizations (e.g., Malaysian Red Crescent Society and Scout Society); and
- Civil Defense Department.

6.1.29 The objective of Directive No. 20 is to provide a policy guideline on the disaster management and search and rescue on the land in accordance with the level of disaster events. The Directive defines three levels for disaster events based on the severity and spread as following:

> **Level I Disaster –** An under-controlled local disaster that has no potential for further outbreak. This is expected to be less complex and may result in little damage and loss of lives. At large, this type of disaster is not detrimental to the daily routines of the people. Generally, District-level authorities have the capacity to control and manage the situation through the agencies of DMRC with limited or no help from outside the District;
>
> **Level II Disaster –** This type of event is more serious affecting larger area spreading two or more districts and has potential for further spreading. Such events may have a potential for significant loss to life and property. Such events may, normally, obstruct daily activities of the local people. Such events are more complex than the Level I Disasters and may pose a serious challenge in terms of search and rescue operations, etc. The State-level DMRC has to handle such events without or with limited help from outside; and
>
> **Level III Disaster –** Originated from Level II Disaster events. Such events are characterized by extreme complexity which has spread over a wide area exceeding two or more states. Such events are handled by the authorities at the Federal level without or with assistance from overseas assistance.

6.1.30 The Directive No. 20 stipulates establishment of DMRC to handle disaster events according to the specified levels. Thus, DMRCs are organized as following:

- District-level DMRC for managing/handling Level I Disasters;
- State-level DMRC for managing/handling Level II Disasters; and

- Federal-level DMRC for managing/handling Level III Disasters.

For the management of a disaster event, the District-level DMRC is responsible for initiating the following actions:

- To evaluate the situation and determining the disaster level and scope;
- To formulate action plan for managing disaster;
- To determine capability in disaster management;
- To determine the types of assistance required from higher or outside authorities; and
- To surrender or take over the disaster management based upon evaluation of event.

The District DMRC is comprised of 15 agencies, which are involved in disaster management and relief works at the district level. The Committee is headed by the District Officer and Deputy Director of the National Security Council acts as the secretary.

6.1.31 The Directive No. 20 also provides the directions:

- To establish "Control Post on Scene" and "Disaster Operation Controlling Center" for management of disaster events effectively;
- To establish a "Media Management Center (MMC)";
- To develop SOPs by all agencies involved in the management of disasters; and
- To conduct regular training and simulation exercises on disaster management by involving relevant stakeholders.

6.1.32 As mentioned earlier, the NSC Directive No. 20 stipulates for a comprehensive, integrated and holistic approach for disaster risk mitigation and management at all levels. This approach emphasizes on all phases of disaster management cycle and involvement of all stakeholders in managing the disaster events. Accordingly, the following activities are being carried out by relevant agencies in Malaysia for disaster risk mitigation and management:

1. Pre-disaster Stage

Prevention and Mitigation Aspects include:

- ❖ to prepare and update disaster action plans on regular basis;
- ❖ to implement the DRR programmes;
- ❖ to plan appropriate measures for disaster risk mitigation;
- ❖ to enforce regulations according to the Legislative Acts/Laws, Guidelines issued like:

  - ➢ Legislative Acts/Laws:
    - Environmental Quality Act;
    - Local Government Act;
    - Street, Drainage and Buildings Act;
    - Occupational Safety and Health Act; and
    - Uniform Buildings Bye-laws;

- Guidelines:
  - Environmentally Friendly Drainage Manual;
  - Land Use Planning Appraisal for Risk Programme; and
  - National Slope Master Plan by the Public Works Department;

- to share the relevant information for prevention and mitigation with all stakeholders; and
- to implement other necessary initiatives as required like flood mitigation programme on "Storm Water Management and Road Tunnel" (or SMART Tunnel), Kuala Lumpur.

Preparedness Aspects include:

- Preparedness initiatives like:

  - identification, monitoring and updating of disaster risk profiles at different levels;
  - planning appropriate measures for proper functioning of facilities and infrastructure during disaster/emergency situation;
  - improving logistics for effective disaster response;
  - preparing own emergency response plans, etc. by different agencies;

- Early Warning Systems have been developed for floods (responsibility of the Department of Irrigation and Drainage), weather forecasts and tsunami early warnings (responsibility of the Meteorological Department), and Air Pollutant Index (API) (responsibility of the Department of Environment). There are rainfall telemetry stations (283 units), river telemetry stations (224 units) and a tsunami buoy for collection of relevant data and information. For issuing early warnings to relevant stakeholders, there are communication systems/mechanisms in place like Government Integrated Radio Network (GIRN), Fixed Line Alert System (FLAS), and Malaysia Emergency Response System (MERS) etc. Besides information is spread using warning sirens, SMSs, mobile phones, fax, web pages and social/mass media etc.;

- Inter- or intra-Agency exercises/drills are conducted on regular basis, which involve multi-sectoral stakeholders;

- Public awareness generation programmes are organized on regular basis for communities at risk. Such programmes are expected to enhance capacity of the community for effective disaster management at local level; and

- Training programmes are conducted for capacity building and enhance understanding and capabilities to handle/manage disaster events.

2. During Disaster/Emergency Phase

Disaster Response Mechanism

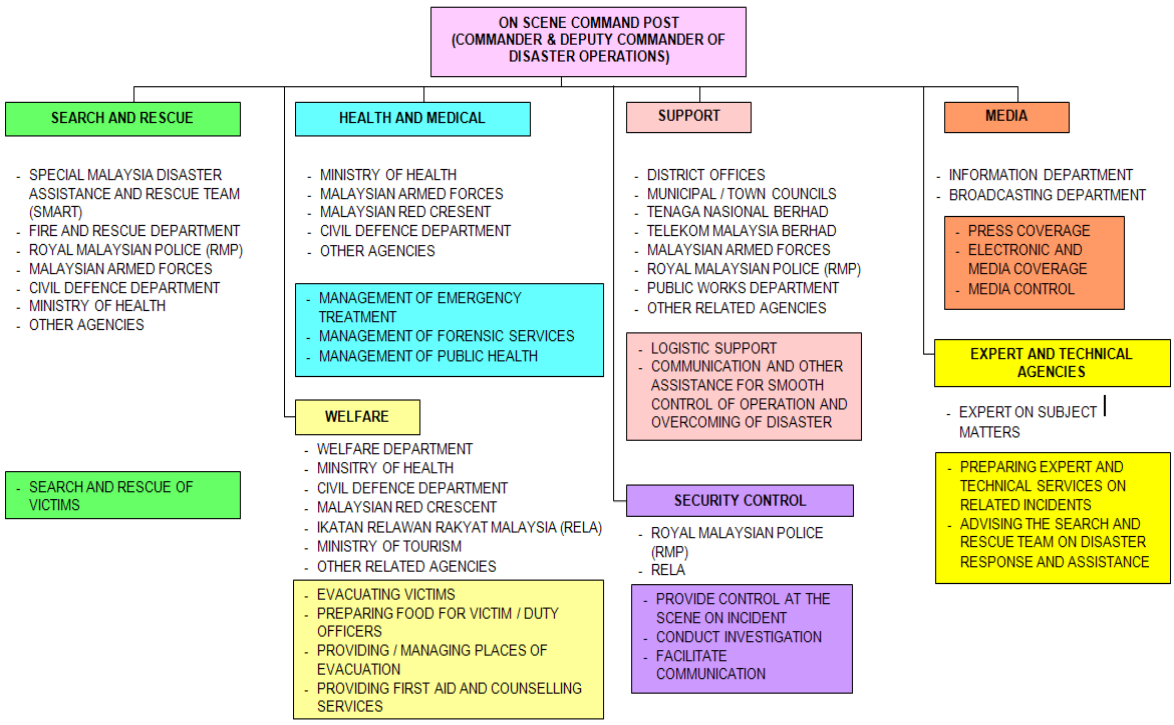
- On-Scene Command Post (OSCP) is set up as soon as an incident is declared a disaster. The District Police Chief is responsible to set up the OSCP. There is a Disaster

Operations Commander, who is in charge of managing the disaster event and responsible for establishing a communication and information network with the Disaster Operations Control Center (DOCC). The OSCP coordinates search and rescue operations;

- Disaster Operations Control Center (DOCC) is set up by the Disaster Management Committee Secretariat. DOCC shall convene regularly to monitor the progress of a disaster and decide on actions to tackle it. The District DOCC shall report to the State and Central DOCC. All relevant government agencies involved are required to assign liaison officers at DOCC to facilitate the smooth handling of disaster situations;

- At the scene of incident, differnet zones are identified for effective disaster management. The *Red Zone* is earmarked as working area for specialist rescue teams with special expertise. The *Yellow Zone* is marked as placement area for OSCP and other Supporting Posts. The *Green Zone* is marked as placement area for media management, victims family center, counseling center, food supplies center, mortuary, rest area, supporting and rehabilitation agencies and voluntary bodies. Movement between different zones is not allowed except with permission from the Disaster Operations Commander;

- Roles and responsibilities of different stakeholders in disaster management have been clearly identified. The below chart provides clear direction to different agencies involved in disaster management.



3. Post-disaster Phase

- For relief and rehabilitation, there are several mechanisms available, which include the Disaster Relief Trust Fund, the Relief Assistance Programme, the Resettlement Housing Construction for Tsunami and Flood Victims, and the Central Store for Disaster Management Assets/Equipment;

- Recovery Programmes include Post-disaster Damage Assessment, Recovery and Reconstruction Programmes, Assistance to Small and Medium Enterprises, Development of Business Continuity Plans, Structural Integrity Evaluation in Risk Areas, Risk Assessment for Future Disasters, and Disaster Risk Reduction through Land Use Planning.

6.1.2 Good Practices/Strengths

6.1.33 The NSC Directive No. 20 is quite detailed and provides clear directions for effective disaster management at all levels. There are several volumes/part of the Directive providing detailed information for specific disasters like flood, drought, earthquake, tsunami, etc. The following are considered as specific strengths regarding the availability of the Directive No. 20:

(i) The Directive adopts a comprehensive, integrated and holistic approach for disaster risk mitigation and management at different levels;

(ii) The Directive emphasizes on establishing SOPs by all agencies involved in the management of disaster events at all levels to clarify and detail out the responsibilities of relevant agencies in managing and responding to disasters;

(iii) The Directive has been reviewed recently (in March 2012);

(iv) The Directive emphasizes on the involvement of private sector, NGOs and community at all stages of disaster management; and

(v) The Directive takes into account regional and international treaties in the area of disaster management.

6.1.34 High levels of public awareness of disaster risk reduction are attained in Malaysia. The NSC Directive No. 20 emphasizes pre-disaster activities including generating public awareness for effective disaster risk mitigation and management at all levels. In this effect, programmes aimed at enhancing awareness and ability of local authorities and the general public to respond during and after emergency/disaster have been constantly implemented by different governmental and non-governmental agencies.

6.1.35 NSC and MMD conduct awareness campaigns and drills/exercises for the public, media and disaster management agencies. The tsunami drill/exercise is carried out at least twice per year. The prominent activities organized for this purpose include:

- Numerous awareness programmes on landslides, tsunami, and floods have been carried out by key agencies, including the Public Works Department, MMD, DID, the Ministry of Education and the Southeast Asia Disaster Prevention Research Institute, Universiti Kebangsaan Malaysia (SEADPRI-UKM). Such programmes include distribution of awareness material and conducting occasional drills;

- The "Disaster Awareness Day" is organized every year since 2005 to raise public awareness on disaster risks as well as to promote commitment among country leaders, decision makers and local authorities towards government efforts in disaster risk management and mitigation. In 2011, Malaysia launched the national-level campaigns on "One Million Safe Schools and Hospitals" and the "Resilient City - My City is Getting Ready";

- Community-based Disaster Management Programme has been carried out to disseminate information and raise awareness at community level. Through collaboration with multiple agencies, the Programme is implemented in a moderated manner to guide participating community stakeholders in identifying the hazards and designing disaster management initiatives, including analyzing and determining capacity needs at local level.

6.1.36 In the Multi-Hazard Early Warming Center at MMD, staff is always present on a 24-hours-a-day and 7-days-a-week (24/7) basis. The collected data is shared with other disaster risk management agencies via the MMD Website and Intranet (e-CUACA).

6.1.37 Malaysia has a foolproof and fail-safe communication system for collection and dissemination of coastal hazard information and warnings. This forms an excellent technical basis for the disaster risk management in the country.

6.1.38 With regard to the flood forecast and warning, the following practices would be termed as good practices:

- NSC holds the meetings before the flood season in which all the stakeholders are invited to participate. All the necessary preparations are reviewed relating to all the phases of the flood hazard;

- MMD organizes the discussion forum in which all the stakeholders including the media are invited. This helps to increase the public awareness on the flood hazard, which in turn helps to invoke the public cooperation and that of the NGOs into the process of the flood mitigation;

- The Flood Forecasting Committee of DID also arranges the country-based training programmes prior to the onset of flood season;

- Reliable flood warning dissemination system is maintained. Overlapping communication system, involving on-line communication, land-line telephone and SMS, is used to ensure that the warning is certainly communicated; and

- Flood hazard maps for some of the major rivers for the 20-, 50- and 100-year return periods have been prepared.

6.1.39 There exists a very good warning dissemination system in Malaysia, where warnings are issued by MMD in Malay and English languages using different modes of communication. At present, most TV and radio stations (government and private) broadcast the warning in various local languages and English.

6.1.3 Gaps and Needs/Challenges

6.1.40 Malaysia has not yet established a multi-hazard plan to obtain mutual efficiency/ effectiveness among warning systems and agencies. Only MMD has a multi-hazard approach for severe weather and for earthquake and tsunami.

6.1.41 A Multi-Hazard Early Warning Center exists in MMD with sufficient up-to-date instruments to monitor potential coastal hazards and with highly competent staff working on a 24/7 basis, but there is still room for further improvement in the monitoring if instrumentation is further improved (e.g., with the increase in rain gauge stations). Other major needs/challenges identified through the Questionnaire are: integration of various systems; sufficient maintenance cost; improved communication; and security of the instruments/equipment.

6.1.42 Although the collected data at the Multi-Hazard Early Warning Center of MMD is shared with other disaster risk management agencies through the Intranet (e-CUACA), any SOPs are not available for the process of real-time data sharing.

6.1.43 One big gap is observed in the administrative set up of the flood forecasting and warning system, where the two Departments, MMD and DID, are involved. In such a tropical country like Malaysia, where the spatial and temporal variability of rainfall is tremendous and thus the flood producing heavy rainfall situation can develop within a relatively short time, a close knit working setup between MMD and DID is definitely needed for the issuance of timely flood warnings. Presently MMD and DID are not only located in different buildings, but are placed under different ministries: MMD is under the Ministry of Science, Technology and Innovation (MOSTI) while DID is under the Ministry of Natural Resources and Environment (MONRE). There is thus a strong need to bring the two departments closer (at least under one Ministry) for better coordination. The following are some specific gaps and needs for flood forecasting and warning:

- The link between MMD and DID is on an "as required" basis and continuous 24/7 link (even during the flood season) is not maintained. No doubt that DID has complete access to the weather data and forecasts through the Internet and landline, yet it is not mandatory for DID to remain in touch with MMD. Furthermore, no representative of DID (which is on receiving end) sits in the Multi-Hazard Early Warning Center of MMD. Under the circumstances, there remains the possibility of DID losing a vital flood information from MMD. It is important that the link between MMD and DID is improved to the level of 24/7 at least for flood season;

- At the moment, only when the water level rises to the warning level, DID starts to pass on the flood information to the concerned State, the media and NSC. There is a need to increase the early warning time by making use of the weather forecasting capabilities of MMD based upon the use of the quantitative precipitation forecast or else to compute the flood forecast on the basis of the observed and radar-monitored rainfall data. This way the lead time of the flood forecast can be considerably improved;

- No floodplain zoning is currently enforced or planned in future. There is a need to have some legislation to keep the floodplain of at least the major rivers clear from settlements, etc. to reduce loss of life and property during floods. This calls for the preparation of flood risk maps, which is currently being undertaken; and

- Even though there are around 15 dams in the country, which have been built essentially for irrigation/hydropower purposes, yet the same can be used for flood management/ mitigation as well. Presently the dams play no flood mitigation role, mainly because these are controlled and operated by the hydropower companies which operate on "stand-alone" bases. There is a need to integrate the dam operations within the overall flood mitigation system to enable their use for the flood mitigation purpose as well.

6.1.44 There is a need for closer cooperation between government and mass media agencies (e.g., national TV and Radio networks) for organizing more outreach programmes to reach large sections of the public, especially school children, in order to raise greater awareness of DRR to build a more resilient community in Malaysia.

6.1.45 Post-disaster needs/impact assessment constitutes a key for establishing a robust recovery (short and long term) programme. There is a need to adopt systematic methodologies to carry out the post-disaster needs assessment.

6.2 Standard Operating Procedures

6.2.1 The major (coastal) hazards prevailing in Malaysia include: (riverine and flash) floods; severe weather (tropical storms/typhoons, heavy rain, strong winds and rough seas, thunderstorms and lightning); earthquake and tsunami; and haze. For these hazards, Standard Operating Procedures (SOPs) are available in Malaysia.

6.2.2 Within the framework of the NSC Directive No. 20, "national" SOPs have been developed by relevant agencies/departments to deal with the disaster management issues in a coordinated and organized manner. The SOPs clarify and detail out the responsibilities of relevant agencies in managing and responding to disaster events. To date, the "national" SOPs have been developed for: floods (Vol. I); industrial disasters (Vol. II); forest fires/open burning and haze (Vol. III); gas and petrochemicals (Vol. IV); earthquakes (Vol. V); tsunami (Vol. VI); and drought (Vol. VII).

6.2.3 The national (i.e., NSC) SOPs are written in Malay language. The English translation of the table of contents of "the SOP for handling flood disaster" (Vol. I) is shown as in Appendix IV.1, and that of "the SOP for handling tsunami disaster" (Vol. VI) is given in Appendix IV.2 The national SOP covers the areas of: readiness and preparedness; reaction and response; relief; recovery; and prevention. Flowcharts extracted from the NSC SOPs on "flood disaster" and on "tsunami disaster" are also given in Appendix IV.3 and Appendices IV.4 and IV.5, respectively.

6.2.4 In addition, each disaster management agency has developed "technical and detailed" SOPs for each specific hazard on how to conduct the analysis and prediction and prepare the warnings. For example, MMD has its own SOPs on "Weather Forecast" and on "Earthquake and Tsunami Alert"; and DID has SOP on "Hydrological Data Collection and Dissemination". Examples of these "technical and detailed" SOPs - flowcharts - are given in Appendices IV.6-IV.10. Appendix IV.11 shows the table of contents of the "SOP on Earthquake and Tsunami Alert, Ver. 2.0 (April 2014)". A complete "SOP on Earthquake and Tsunami Alert" (English translation) is attached separately to this Mission Report. Each disaster management agency also has its business continuity plan to continue its operations in case the work site is affected by adverse physical conditions, such as power cut, fire or office evacuation. The Disaster Recovery Center will be put in place as a fail-safe system.

6.2.5 The Social Welfare Department (JKM) also has the SOP on disaster management. Its table of contents includes: Introduction; Level of Disaster Management; Disaster Management Committee and Mechanism; Role and Responsibility of the Social Welfare Department (JKM); Disaster Management Operation of JKM; Recovery Measurements; and Contribution to Disaster Victims. A flowchart for disaster management of the Social Welfare Department is demonstrated in Appendix IV.12.

6.2.6 Some other charts, diagrams and Website examples collected during the mission visit to Malaysia are given in Appendix V.

Cross-cutting Integrated and Coordinated Aspects

6.2.7 There is no SOP wherein the activities of all disaster management agencies/departments are well coordinated before, during and after a hazard. NSC has the jurisdiction over all the agencies/departments and this is exercised through the set of instructions, but not through a well-documented, all encompassing SOP. Such a SOP is required to be formulated.

SOP Development, Update and Testing

6.2.8 MMD follows the PTWC and JMA guidelines for development of SOP for tsunami but not for weather. As for DID, it has "Guidelines" or standards for development of SOP. The Departments' "technical and detailed" SOPs are reviewed once a year by the respective Departments. Internal and external auditors monitor to ensure that SOPs are followed consistently over time. Historical records of SOP modifications are kept at the end of the latest SOPs.

Synergized Process

6.2.9 Departments' SOPs are independent and not synergized. Only SOPs/EWS for tsunami and severe weather have been synergized.

Media Aspects

6.2.10 During disaster/emergency phase, a "Media Management Center (MMC)" is set up by the Department of Information at the site of incident. The necessary facility such as media conference space, briefing space, radio, television and communication facilities/equipment is prepared for dissemination of the information on the disaster to the public. MMC works as a single news source. The Department of Information does not have SOPs but the NSC Directive No. 20 provides guidelines on the work (see Appendix IV.13 - English translation of the Guidelines for MMC on Disaster/Crisis).

6.2.11 The Department of Information only disseminates the warning information to the media. The information is then disseminated by the media to the general public. The media use plain language for easy understanding in Malay and other local languages like Tamil and Chinese. All the TV stations (government TV, i.e., Radio Televisyen Malaysia (RTM1&2) and private TV channels) use Malay and English languages for warning information. The government TV also uses sign language during the news broadcast to ensure people with disabilities receive and understand warnings. Local newspapers in four main languages (Malay, English, Chinese and Tamil) are also used for dissemination of the information/warnings. The media is currently satisfied with the language and quality/quantity of the information/warnings provided by MMD/DID.

Regional and International Frameworks for Disaster Management

6.2.12 The "ASEAN Agreement on Disaster Management and Emergency Response" was concluded in July 2005, ratified by 10 Member Countries (including Malaysia) of ASEAN, and entered into force on 24 December 2009. This agreement forms a legal framework for all ASEAN States and serves as a common platform in responding to disasters within ASEAN for cooperation, coordination, technical assistance, and resource mobilization in all aspects of disaster management. It also affirms ASEAN's commitment to the Hyogo Framework of Action (HFA). The ASEAN Coordinating Centre for Humanitarian Assistance serves as the operational coordination body. *[The "ASEAN Agreement on Disaster Management and Emergency Response" is separately attached to this Report.]*

6.2.13 Malaysia also has coordination/cooperation mechanisms with international and regional organizations, e.g., WMO, IOC, the ESCAP/WMO Typhoon Committee and the ASEAN Sub-Committee on Meteorology and Geophysics (SCMG) of the ASEAN Committee of Science and Technology. Without official agreements/MOUs and SOPs, but under "mutual/common understanding" through the international/regional meetings (e.g., TC sessions, IOC and WMO meetings) and within these frameworks, MMD and DID perform their duties and responsibilities for disaster mitigation and risk management based on the international/regional standards.

6.3 Recommendations for the SSOP Manual

6.3.1 The meeting in Malaysia endorsed the suggestions/recommendations already made at the pilot workshops on the contents of the SSOP Manual, including: minimum baseline standard requirements and guidelines on format and content; checklist for SOPs for different types/levels of threat; guidelines for multi-hazards SOPs; need for regular updating; need to conduct regular exercises/drills to validate SOPs; SOP examples from other countries; list of relevant available websites, case studies, documents, etc.; examples of usage of social media and its application; and ideas on advance communication techniques.

6.3.2 MMD suggested that some international/regional standards (or examples from other countries) for definition of criteria/thresholds for issuing various warnings be contained, as reference, in the Manual. In view of the usefulness of the SSOP Manual, MMD indicated its hope that the Manual will be translated into the local languages of TC/PTC Members, including Malay.

7. Conclusions and Recommendations

Conclusions

7.1 Malaysia has a very good DRR system, which includes a strong early warning system (EWS), with the established excellent legal framework. The NSC Directive No. 20 is the guiding principle, which provides the basis for and emphasizes establishing SOPs for effective management of disaster events. Not only SOPs are developed for all major hazards faced by the country, but also the SOPs are reviewed on regular basis. Staff dealing with different types of hazards/disasters is proficient in use of the SOPs. Education and training of relevant staff in use of the SOPs is a regular feature. Special staff orientation programmes are also organized after all SOPs review/updating processes.

7.2 Within the framework of the NSC Directive No. 20, "national" comprehensive SOPs have been developed by all EWS partners to deal with the disaster management issues in a coordinated and organized manner. In addition, "technical and detailed" SOPs for handling each specific hazard have been developed by each disaster management agency.

7.3 High-level government realization of the need and thus the government's commitment to the administrative and financial support for the EWS have been achieved in Malaysia. As a result, and through awareness campaigns and outreach programmes, the level of public awareness on disaster risk reduction is kept high in Malaysia.

Recommendations

7.4 The Malaysian EWS presents several good examples, which need to be replicated in the region, e.g., SOPs flow charts for severe weather, tsunami and flood; flow charts for disaster management of flood and tsunami disasters; etc. It is highly recommended that these products

and SOP examples be incorporated into the SSOP Manual as examples of good practices. There are also numerous media products, which may be included in the SSOP Manual as good practices from the PTC and TC regions.

7.5 There is a need for establishing a Multi-hazard Early Warning Center dealing with all the key hazards in Malaysia. The existing Multi-hazard EW Center at MMD should be upgraded by adding facilities for other hazards like flood, drought, haze EWs, etc., so as to synergize the system.

7.6 The following areas still need further improvement in Malaysia:

- Technical development of the warning services to the extent that reasonably reliable hazard warnings could be issued;

- Technical development of a quick and accurate communications system for the effective use of disaster early warning information;

- Development of SOPs for Media Management Center to strengthen its effective role and efficient operation in warning dissemination to the public; and

- Coordination mechanism between national, state and district levels with an attempt to add more user sectors within the government.

7.7 Since the establishment of the Multi-Hazard Early Warning System at the MMD headquarters in January 2005, fortunately no disasters related to earthquake and tsunami have occurred in Malaysia to date, although there were several occasions of severe weather that caused major floods. The performance of the system has therefore not yet been fully tested with the actual hazards. It is recommended that SOPs be further reviewed and developed for unanticipated/unforeseen emergency situations, which requires close cooperation and coordination among the disaster management agencies, having unexpected scale of hazards and complex hazards at the same time (e.g., tropical cyclone-induced heavy rain and storm surge; combination of earthquake, land subsidence, tsunami and heavy rain, etc.).

7.8 In this connection, it is recommended that MMD simulate a mock drill for a given/pre-determined scenario of a devastating disaster event (possibly in terms of a super cyclone). This drill/exercise would provide an opportunity to test the existing multi-hazard early warning system including the use of SOPs. The lessons learned from such an exercise would form a basis for further revision of the SOP/EWS.

Concluding Remarks

The main purposes of the mission visits were: to review existing coastal multi-hazards EWS SOPs of hydro-meteorological services, disaster management agencies, media, elected officials, and others from national to district to local levels; to identify good practices, gaps and needs,

and recommendations for internal and cross-cutting SOPs; and then to compile data, information, examples, and diagrams collected on SOPs good practices, gaps and needs, and recommendations for inclusion in the Manual on Synergized Standard Operating Procedures (SSOP) for Coastal Multi-Hazards Early Warning System which will meet the needs of the 13 beneficiary countries involved in the Project. These purposes have been met and were described above.

Now the challenge is to take the information from these six missions and develop a Manual of Synergized Standard Operating Procedures for Coastal Multi-hazards Early Warning Systems focusing on the hydro-meteorological aspects to meet the needs of diverse users and to create a Manual that can and will be used. This development will be done in collaboration and coordination with the consultants, the beneficiary countries, the Task Force, the TC Advisory Working Group, and partner organizations. This Manual will then form the foundation for the training and working meeting scheduled under Activity 2 of the project.

Appendix I

List of Participants

28-29 August 2014

No.	Name	Agency/Division	Designation
1	Mr Alui Bahari	Chairman (MetMalaysia)	Deputy Director-General (Weather & Climate)
2	Mr Wong Teck Kiong	MetMalaysia – Strategic Planning & International Division	Director
3	Dr Mohd Hisham Mohd Anip	MetMalaysia – National Weather Centre	Meteorological Officer
4	Ms Irene Eu Swee Neo	MetMalaysia – Tsunami Early Warning System Section, National Earthquakes & Tsunami Centre	Section Head
5	Ms Khafiza Manan	MetMalaysia – Geophysics Technical Section, National Earthquakes & Tsunami Centre	Section Head
6	Mr Phang Kun Liong	MetMalaysia – Corporate Services & Commercial Division	Meteorological Officer
7	Ms Lucia Enggong	MetMalaysia – Strategic Planning & International Division	Meteorological Officer
8	Mr Amirul Nizam Marodzi	MetMalaysia – Strategic Planning & International Division	Meteorological Officer
9	Ms Nursyarafina Shafie	MetMalaysia – Strategic Planning & International Division	Meteorological Officer
10	Ms Junainah Ali	MetMalaysia – Strategic Planning & International Division	Meteorological Officer
11	Ms Hanashriah Hassan	MetMalaysia – Strategic Planning & International Division	Meteorological Officer
12	Ms Siti Rohana Mohd Saad	MetMalaysia – Strategic Planning & International Division	Meteorological Officer
13	Mr Mohd Khalil Ab Aziz	MetMalaysia – Perlis Met Office	Director
14	Mr Rosli Zakaria	MetMalaysia – Kedah Met Office	Director
15	Mr Zabani Md Zuki	MetMalaysia – Penang Met Office	Director
16	Mr Wan Mohd Nazri Wan Daud	MetMalaysia – Perak Met Office	Director
17	Mr Maqrun Fadzli Mohd Fahmi	MetMalaysia – Kelantan Met Office	Director
18	Mr Jenuwa Husin	MetMalaysia – Terengganu Met Office	Principal Assistant Director
19	Mr Azemi Daud	MetMalaysia – Pahang Met Office	Director
20	Mr Amirzudi Hashim	MetMalaysia – Johor Met Office	Director
21	Cik Siti Norbaizura Mat Said	MetMalaysia – Sabah Met Office	Meteorological Officer
22	Ms Noor Azra Ahim	MetMalaysia – Sarawak Met Office	Meteorological Officer
23	Haji Zainalfikri Hj Daud	Department of Irrigation and Drainage, Kedah	Deputy Director
24	Mr Sazali Osman	Department of Irrigation and Drainage	Principal Assistant Director
25	Ir. Arman Mokhtar	Department of Irrigation and Drainage	Principal Assistant Director
26	Mr Abdul Hafiz Mohamad	Department of Irrigation and Drainage	Senior Assistant Director
27	Mr Mohd Khairul Sabri Abdullah	Department of Irrigation and Drainage	Assistant Director
28	Ms Sumiliana Sulong	Department of Irrigation and Drainage, Pahang	Engineer
29	Mr Danapal Kannusamy	Department of Irrigation and Drainage, Selangor	State Hydrological Officer
30	Mr Jamesy Mijek	Department of Irrigation and Drainage, Sarawak	Civil Engineer
31	Mejar Mohd Radzi Abdul Hamid	Malaysia National Security Council, Kedah	Assistant Secretary (Military)
32	Mr Mohammad Hazam Ismail	Department of Social Welfare, Penang	Principal Assistant Director
33	Mr Mohammad Md Nor	Department of Social Welfare, Kedah	Assistant Director
34	Ms Rosni Yaacob	Department of Social Welfare, Tumpat, Kelantan	Assistant Director
35	Mr Mohd Shahir Mustafar	Department of Information	Assistant Director

Appendix II

QUESTIONNAIRE (SSOP Project)
Completed by Malaysia

I. Background Information

SECTION 1: Contact Information (Name, Address, Phone, Fax, E-Mail)

Question 1: *In addition to the SSOP focal point, please identify others helped to complete this questionnaire.*

Answer 1: This questionnaire was answered mainly by the Malaysian Meteorological Department (MMD) at the following address:

Malaysian Meteorological Department (MMD)
Jalan Sultan, 46667
Petaling Jaya
Selangor, Malaysia

Tel:+603-79678000, Fax: +603-79550964, email: mmd@met.gov.my

The questionnaire was complemented by the Department of Irrigation and Drainage (DID) and other disaster risk management agencies, attended at the working-level meetings with the consultants on 28-29 August 2014.

II. Early Warning System

Section 2: Authority and Coordination

2a: Legal Framework

Question 2: *What laws, administrative rules or similar legislation does your country have which designate specific government agencies to provide science-based coastal warnings to specific government agencies, to disseminate public warnings instructing the public to take or prepare to take actions, and to provide appropriate emergency response for coastal hazards?*

Answer 2: The National Security Council (NSC) Directive No. 20 - The Policy and Mechanism for National Disaster Management and Relief.

- *Do these laws, administrative rules or similar legislation designate standardize processes and specific roles and responsibilities for warning issuers, disaster management agencies, media, decision makers, and other agencies?*

Answer 2: Yes

- *What is designated and to what level**?***

Answer 2: It designate specific roles from the top down, i.e. from the decision makers that is informed on the potential or actual coastal hazard from MMD and back in terms of issuance of warnings and at the same time the NSC will be the coordinator for the disaster management agencies.

- *Do these laws, administrative rules or similar legislation cover all national, district, and local level responsibilities or are there separate laws or rules for different levels of government?*

Answer 2: Yes

- *Please briefly describe these, listing the laws or the agencies designated, and their roles and responsibilities.*

Answer 2: The National Security Council coordinates the all disaster risk management agencies:

i) Early Warning for Severe Weather and Earthquake & Tsunami by MMD
ii) Early Warning for floods by DID
iii) Rescue and evacuation by Military, Police, Fire & Rescue Dept. etc.
iv) Recovery by National Welfare Dept., Health Dept., etc.

Question 3: *What coordinated, integrated Memorandums of Understanding (MOUs) or Standard Operating Procedures (SOPs) are there among the various early warning system agencies on specifics of how to implement the assigned roles and responsibilities at the national level, district level, and/or local level? Please specify the MOUs or SOPs.*

Answer 3: National Security Council Directive No. 20 (NSC Directive No.20)

2b: National Platform for Disaster Reduction

Question 4: *Does your country have a national committee or other mechanism for guiding disaster risk reduction in general?*

Answer 4: Yes, NSC is guiding DRR in general.

Question 5: *Who (types of persons and agencies) are members of this committee?*

Answer 5: Deputy Prime Minister (Chair), Minister of Information, Minister of Finance, Minister of National Unity and Community Development, Chief Secretary to the Government and Director Generals from other related disaster management agencies including the Malaysia Red Crescent Society.

Question 6: *Does your country have similar coordination mechanisms at the district and community level? Who compose these committees?*

Answer 6: Yes. Malaysia has the National Disaster Management Committee, the State Disaster Management Committee and the District Disaster Management Committee. The National Disaster Management Committee is chaired by the Deputy Prime Minister/Minister in the Prime Minister's Department, while the State and District level Committees are chaired by the State and District level officials.

Question 7: *What authority does this committee have (decision-making, policy-making, advisory (if yes, to whom), independent reporting to one agency, etc.) and for what levels (all, national, district, local)?*

Answers 7: Depending on the extent of the disaster. (These Committees have decision-making and policy-making authority at national, state and district levels.)

Question 8: *Does this national committee have SOPs for handling different coastal hazards? Do district and/or local committees have SOPs? Can you provide examples?*

Answer 8: Yes. NSC has coastal-related SOPs for Flood, and SOP for Earthquake and Tsunami, as well as SOP for Oil Spill and Haze.

2c: National Organizations

Question 9: *What are the important organizations, both government and non-government, for the implementation of an early warning system?*

Answer 9: MMD, Department of Environment (DOE), Department of Irrigation and Drainage (DID) and NSC

Question 10: *What roles will they play and have these roles been coordinated? Please specifically include the roles, responsibilities and authorities of the National Meteorological Service and the National Disaster Management Organization, or their equivalent monitoring, warning evaluation and warning dissemination agencies.*

Answer 10: MMD – monitoring weather & tsunami, DID – flooding & coastal inundation, DOE – haze & oil spill

Question 11: *Which of these agencies have SOPs for their assigned tasks? Please provide examples as possible.*

Answer 11: Every disaster management agencies have SOPs for their assigned tasks and is coordinated by the National Security Council which in turn is in direct command from the Prime Minister.

Section 3: Coastal Hazards Warning Centers and Monitoring

3a: Reception of Warnings from International Agencies

Question 12: *How does your country currently receive international warnings for coastal hazards? From whom, by what method and who receives it?*

Answer 12: From JMA, PTWC, RTSP (Australia, India and Indonesia) via websites, GTS, email, AFTN, SMS, WIS and fax

Question 13: *What is the back-up or alternative method for receiving the warning messages?*

Answer 13: Websites, GTS, email, AFTN, SMS, WIS and fax will back up each other.

Question 14: *Do the agencies sending and receiving these international warnings provide 24-hours-a-day, 7-days-a-week services?*

Answer 14: Yes. There are always officers on duty 24-hours a day.

Question 15: *What communication arrangements, regional agreements, and coordination mechanisms with international and regional organizations were established and used?*

Answer 15: None. Under "mutual/common understanding" through the international/regional meetings (e.g., TC session, IOC and WMO meetings) and frameworks

Question 16: *Does the agency (agencies) who receive the international warnings have SOPs on what to do with them when received and where to send them to? What are they? Please provide examples.*

Answer 16: Yes, e.g., MMD has its own SOP on Weather Forecast and SOP on Earthquake and Tsunami Alert, and DID has SOP on Hydrological Data Collection and Dissemination.

Question 17: *Are there SOPs available for the implementation of the backup or alternative method to receive these warnings? Is this backup method tested regularly?*

Answer 17: Yes.

3b: National Warning Centers

Question 18: *Does your country operate separate national or regional centers for coastal hazards or does one warning center handle all warnings for coastal hazards? Which center handles which hazard?*

Answer 18: The separate Centers handle warnings as follows: MMD - severe weather & tsunami, DID - flooding & coastal inundation, DOE - haze & oil spill

Question 19: *Do the warning centers have staff that are always present in the operation center 24-hours-a-day, 7-days-a-week, or are staff on an on-call basis through automated processes?*

Answer 19: Yes, the staff are always present on a 24/7 basis.

Question 20: *Do the different warning centers have MOUs or SOPs describing how the different centers will coordinate actions in a multi-hazard situation? What are they? Please provide examples.*

Answer 20: Yes. Different warning centers will coordinate under the NSC Directive No. 20.

3c: Utilization of Data for Monitoring, Data Collection and Data Dissemination

Question 21: *Does your country have sufficient equipment and sensors to monitor potential coastal hazards in real time? If not, how does the country conduct sufficient monitoring without this equipment?*

Answer 21: Yes

Question 22: *Describe the current capacity (equipment to receive, technical ability to access and interpret, etc.) of your country in utilizing sensors for hazard monitoring, data collection and exchange?*

Answer 22: Observations are done 24 X 7, with highly competent staff and advanced technology

Question 23: *What are the major obstacles faced by your country with respect to the use of sensors data for hazard monitoring, data collection and exchange – insufficient technical expertise, data not timely, data format, lack of funds, lack of equipment, or other reasons?*

Answer 23: Integration of various systems, maintenance cost, communication problem & safety of the equipment

Question 24: *How is collected data shared with among agencies? Is this done in real time?*

Answer 24: Yes, shared via website and Intranet

Question 25: *How do you obtain applicable data/analyses from regional networks, adjacent territories and international entities in real time?*

Answer 25: Collection centers via the Internet. Data from international entities, regional networks are obtained through various networks, such as Internet, GTS, etc.

Question 26: *Are there SOPs or instructions on how to interpret these data, how to analyze these data, critical thresholds, strengths and weaknesses of the sensors, how to handle outages or malfunctioning sensors? Which SOPs are implemented and documented?*

Answer 26: Yes. SOPs on severe weather and on earthquake & tsunami

Question 27: *Are there SOPs in place for the process of real time sharing and availability of data collected? Please provide examples.*

Answers 27: ***Data sharing is made through the Intranet without any SOPs.***

Question 28: *Are there SOPs or instructions on how to handle data/analyses from regional, international, or adjacent sources?*

Answer 28: Yes, with SOPs in MMD.

Section 4: Warning and Forecast Services

4a: Warning Coordination and Agreements

Question 29: *Are standardized processes, and roles and responsibilities of all organizations generating and issuing warnings established and mandated by law? What are these?*

Answer 29: Follow the procedure of NSC Directive 20.

Question 30: *What agreements and interagency protocols were established to ensure consistency of warning language for different coastal hazards when handled by different agencies?*

Answer 30: Follow the procedure of NSC Directive 20.

Question 31: *Was a multi-hazard plan established to obtain mutual efficiencies/effectiveness among warning systems and agencies? What is the plan?*

Answer 31: No.

4b: Warning Generation/Preparation

Question 32: *How do you ensure data analyses, prediction and warning generation are based on latest scientific and technical methodologies? If they are not, why – training, equipment (both hardware and software), other?*

Answer 32: Regularly update the SOP & provide training

Question 33: *Does each warning center have detailed SOPs on each hazard on how to conduct the analysis and prediction and prepare the warnings?*

Answer 33: Yes.

Are there separate SOPs for each hazard or is there a multi-hazard approach used?

Answer 33: SOPs for each hazard is used.

Do these SOPs contain technical information (thresholds, what to look for, critical requirements) as well as how and when to coordinate with other agencies during the preparation of warnings?

Answer 33: Yes.

Question 34: *Are data and warning products issued in accordance with international and national standards and protocols? Where these standards jointly developed and coordinated? What standards are used?*

Answer 34: Yes. Agency-specific standards are used. WMO or regional standards needed.

Question 35: *Are the required standards and protocols easily available for people to reference when preparing warnings? Are there separate SOPs for this or are they combined with others? Please provide examples.*

Answer 35: No. Restricted Circulation

Question 36: *How are warnings generated and disseminated in a variety of formats to meet users' needs? Media, decision-makers, disaster managers, government officials and public (e.g., for diverse cultural, social, gender, linguistic and educational backgrounds)? What are these formats?*

Answer 36: Use plain language for easy understanding in Malay and English languages.

Question 37: *How are warning alerts/messages geographically-specific and threat specific to ensure warnings are targeted to those at risk only and they understand potential impacts? Please provide samples.*

Answer 37: Issued based on areas affected by the hazard (see Warning examples)

Question 38: *Are there SOPs available which clearly state the format, process, and procedures to use for each warning? Are there SOPs describing procedures to ensure the warnings are geographical and threat specific with examples?*

Answer 38: Yes. (See the example of SOP on Flood)

Question 39: *Are warnings consistent over time and include follow-up actions when required? What procedures and SOPs are used to ensure consistency and to ensure follow up actions needed? Please provide samples.*

Answer 39: Yes. Department SOPs includes follow-up actions.

Question 40: *How do warnings communicate target risk information to help guide/motivate user response? Please provide samples.*

Answer 40: Wording that indicates the time, places and potential hazards.

Question 41: *What is done to ensure people with disabilities receives and understands warnings (sign language, text and audio formats)? Please provide what ways are used.*

Answer 41: Use of sign language during the news broadcast only on national TV: RTM1&2

Question 42: *What strategies have been developed to build credibility and trust in warnings (e.g., understanding difference between forecasts and warnings)? Have SOPs been developed on how to build this credibility?*

Answer 43: Awareness campaign. No SOPs have developed on how to build warning credibility so far.

Question 43: *What steps have been taken to minimize false alarms and to improve communications to maintain trust in the warning system? Have they been documented in SOPs or procedures?*

Answer 43: Regular maintenance and trial run.

Question 44: *What fail-safe systems are in place, such as power back-up, office evacuation, equipment redundancy, office evaluations, and on-call personnel systems?*

Answer 44: Disaster Recovery Center (DRC).

Question 45: *Are there SOPs for implementing backup systems, office evacuation, calling in extra personnel, etc.? Which ones are documented? Please provide an example.*

Answer 45: Yes, it follows the Business Continuity Plan of the Dept. DID has separate SOPs to sustain operation, such as in case of fire.

4c: Assessment Process

Question 46: *What is the plan to routinely monitor and evaluate operational processes, including data quality and warning performance?*

Answer 46: Implementation of ISO

Question 47: *Are there SOPs on how to perform this monitoring and evaluation on a routine basis? What ones are available? Please provide an example.*

Answer 47: Schedule maintenance and performance measurement as stipulated in ISO implementation

Question 48: *What verifications and assessments of warning services are conducted after events to measure performance, identify and correct deficiencies, and capture best practices?*

Answer 48: Routinely verified and comply with the standard KPI by an Internal Auditor.

Question 49: *What inter-agency "after action" meetings are held to improve early warning system?*

Answer 49: Post-mortem (partially and sometimes)

Question 50: *Are there SOPs on how to perform "after action" verifications, assessments, and meetings to include when they are needed, specified time frames, and people involved? What ones are available? Please provide an example.*

Answer 50: Yes. Under the NSC Directive No. 20.

Section 5: Dissemination/Communication and Response

5a: Organization

Question 51: *Who are the recognized authorities empowered to disseminate warning messages for coastal hazards?*

Answer 51: The Director Generals of MMD, DID & DOE

Question 52: *Are functions, roles and responsibilities of each agency and at all levels (national, district, and local) in warning dissemination process specified in legislation or government policy? What are these?*

Answer 52: Yes. This is under the NSC Directives 20.

Question 53: *Does each agency have detailed SOPs on how to execute their assigned roles in dissemination? How have these been coordinated with the other agencies and are they integrated to ensure maximum efficiency when used? Which ones are available? Please provide an example.*

Answer 53:Yes. NSC is the coordinator that will integrate other agencies to ensure maximum efficiency.

Question 54: *What is the communication strategy to ensure that people with disabilities, including people who are deaf or have a hearing disabilities receive broadcasts? Have these been coordinated with other agencies and with people who they serve?*

Answer 54: Use of sign language during the news broadcast on national TV: RTM1&2.

5b: Dissemination/Communications

Question 55: *How are communication and dissemination systems tailored to reach the entire population and to meet the needs of individual communities (e.g., radio or television for those with access; and sirens, warning flags*

or messenger runners for remote communities) at all levels (national, district, and locally)? What are the multiple communications processes used?

Answer 55: Most of the above. The MMD broadcast weather as well as warning (tsunami, severe weather and tropical cyclone warning) three-time daily via national television channel. Despite that, MMD also uses radio and local newspaper to disseminate the warnings.

Question 56: *How do the disaster risk management bodies, the warning agencies, and media maintain active communications during a hazardous event? When is this done? Are there coordinated SOPs available that specific how this will be done and when? What are these?*

Answers 56: Yes, using the specific communication system provided by the Government, i.e. GIRN (Gov. Integrated Radio Network)

Question 57: *Were agreements developed to use private sector resources (e.g., amateur radios, safety shelters)? With whom and for what? Are these documented as MOUs or some type of agreements?*

Answer 57: No.

Question 58: *Are communication systems two-way and interactive for confirmation that warnings have been received and to report impacts? What systems are used?*

Answer 58: Partially yes. Phones and Social Media are two-way. So far, so good.

Question 59: *Do non-government, people-centered, community-based organizations, such as the local Red Cross/Red Crescent Society, play a role in the receipt and delivery of multi-hazard early warnings to people at the local level? If yes, please describe their role and activities.*

Answer 59: Yes, in the case of tsunami, floods and others.

Are there MOUs or agreements which document and define those roles?

Answer 59: No.

Question 60: *Are there training programs for the media on coastal, multi-hazards, mitigation, warning, and preparedness? If yes, please describe?*

Answer 60: Yes. MMD and NSC conduct awareness campaign and drill. Tsunami exercise/drill is done at least twice per year.

5c: Response

Question 61: *How are procedures tested or exercised to improve the response through better planning and preparedness? How is this done, who is involved, and whether it is done regularly? Are these procedures and their frequency documented in MOUs, procedures or some other type of agreement?*

Answer 61: Within the awareness campaign. It involves people at prone areas, agencies involved in disaster management and policy makers.

Question 62: *Have post-coastal hazard impact assessments been conducted in your country?*

Answer 62: Partially yes

If yes, what types of data were collected, who was involved, and how were they coordinated. Are these procedures and their frequency documented in MOUs, procedures or some other type of agreement?

Answer 62: NSC is involved. The NSC Directive No. 20 provides guidelines for Departments to do.

Question 63: *Are there any joint community-level education and preparedness programs for coastal hazards conducted by warning issuers, disaster management agencies, and media? Who was involved and what was done?*

Answer 63:Yes. Warning issuers, disaster management agencies, and media.

Question 64: *Do non-government, people-centered, community-based organizations, such as the local Red Cross/Red Crescent Society, play a role in the early warning preparedness and community outreach and education to people at the local level? If yes, please describe their role and activities. Are there MOUs or agreements which document and define these roles?*

Answer 64: Yes. Their role and activity are coordinated by the NSC.

III. Standard Operating Procedures

Section 6: SOP Development

Question 65: *How were such factors as the age, education, knowledge, skills, experience and training of the person (s) considered in the SOPs?*

Answer 65: No, one SOP for all.

Question 66: *Are new SOPs written or current ones modified when new equipment or processes create new work situations? Is there a documented review process?*

Answer 66: Yes. SOPs are reviewed once a year.

Question 67: *Were appropriate different styles of SOPs (simple step, hierarchical step, linear graphic flow chart, annotated pictures, and/or branching flowchart) considered when SOPs were developed?*

Answer 67: Yes

Section 7: SOP Content and Use

Question 68: *Does the agency and/or government set standards for SOPs? Were these standards used to develop SOPs?*

Answer 68: Yes. e.g., DID has "Guidelines" to develop SOPs.

Question 69: *Was a certain format used to develop SOPs to ensure standardization and had all required information such as numbers, titles, preparer names, who approved, revision history, purpose and scope identified, number of people required, safety concerns, equipment needed, referenced documents or checklists easily available, and other items required for good SOPs? What format used?*

Answer 69: Following the Guidelines and with reference to other available SOPs

Question 70: *Were SOPs that involve a long list of steps broken into separate logical sections of about 10 steps per section? Are SOPs clear, short sentences, not too wordy, and specific?*

Answer 70: Yes/No – depending on SOP

Section 8: SOP Documentation

Question 71: *How is an historical record kept of all SOPs when modifications are made to that process and when a SOP must be revised?*

Answer 71: In compliance with the ISO procedure. Historical records are kept at the end of the latest SOP.

Question 72: *Are computer accessible files and at least one notebook as backup of all approved SOPs available? Where are they located?*

Answer 72: Yes. Backup SOPs are located in three different places in the same Department.

Section 9: SOP Monitoring, Review and Training

Question 73: *How are SOPs used to facilitate training in procedures, for both new personnel, those that need re-training (i.e., after extended absence from a position), or for cross training using the step by step instructions in the SOPs to ensure that nothing is missed?*

Answer 73: Use SOP as part of work manual

Question 74: *Is an annual evaluation and review system established to be certain that over time all the steps of SOP are still correct and appropriate for the production system? How is it performed?*

Answer 74: Yes. Under the ISO implementation

Question 75: *How are SOPs used to regularly evaluate work activity and possible improvements? Do workers routinely evaluate existing SOPs, work practice guidelines, and other documents for possible revisions to SOPs?*

Answer 75: Yes. At least once a year.

Question 76: *What procedures are in place to ensure that SOPs are followed consistently over time?*

Answer 76: By Internal and External Auditors.

Appendix III.1

Example of Warning on Strong Winds and Rough Seas

FIRST CATEGORY WARNING

WARNING ON STRONG WINDS AND ROUGH SEAS

SECTION A: WARNING FOR SHIPPING

WARNING ON STRONG WINDS AND ROUGH SEAS (FIRST CATEGORY)

i) Typhoon Matmo is located at Latitude 15.8 N and Longitude 127.6 E, at 5.00 am, 21st July 2014, approximately 1472 km Northeast of Sandakan, Sabah and moving Northward with speed of 15 km/h.

In this connection:

Strong Southwesterly winds of 40-50 kmph with waves up to 3.5 metres occuring over the waters off Palawan, Reef North, Condore and Layang-Layang are expected to continue until Thursday, 24th July 2014.

This condition of strong winds and rough seas is dangerous to small crafts, recreational sea activities and sea sports.

ii) Strong Southwesterly winds of 40-50 kmph with waves up to 3.5 metres occuring over the waters off Phuket are expected to continue until Thursday, 24th July 2014.

This condition of strong winds and rough seas is dangerous to small crafts, recreational sea activities and sea sports.

SECTION B: WARNING FOR MALAYSIAN WATERS

WARNING ON STRONG WINDS AND ROUGH SEAS (FIRST CATEGORY)

Strong Southwesterly winds of 40-50 kmph with waves up to 3.5 metres occuring over the waters off Perlis, Kedah and Sabah (Kudat) are expected to continue until Thursday, 24th July 2014.

This condition of strong winds and rough seas is dangerous to small crafts, recreational sea activities and sea sports.

SECTION C: LOW VISIBILITY WARNING

Low horizontal visibility below 5 kilometres over the waters off Northern Straits of Malacca due to hazy condition. This condition is expected to persist until Thursday, 24th July 2014.

This condition is dangerous to ships that are not equipped with navigational equipment.

Updated on 21 July 2014, at 09:06AM

Oleh: Jabatan Meteorologi Malaysia
Kementerian Sains, Teknologi dan Inovasi

Amaran JMM.RML07/701/03/Jld.103 (22)

No. Keluaran: 01	No. Pindaan: 00	Tarikh Kuatkuasa: 01.04.2014

Appendix III.2

Examples of Advisory/Warning related to Tropical Cyclone

THIRD CATEGORY WARNING
WARNING ON STRONG WINDS AND ROUGH SEAS

Tropical Depression is located at Latitude 8.3 N and Longitude 124.4 E, at 5:00 am, 3rd January 2013, approximately 783 km Northeast of Semporna, Sabah and moved Westwards with estimated speed of 45 km/h.

STRONG WINDS AND ROUGH SEAS (THIRD CATEGORY) -Update

Strong Northeasterly winds over 60 kmph with waves more than 5.5 metres occurring over the waters off Kelantan, Terengganu, Samui, Condore, Reef North, Layang-Layang & Palawan are expected to continue until Friday, 4th January 2013.

In addition, the coastal areas of Kelantan & Terengganu are vulnerable to sea level rise. This condition is expected to continue until Friday, 4th January 2013. This condition of strong winds and rough seas is dangerous to all coastal and shipping activities including workers on oil platform.

Updated on 03 January 2013, at 07:46AM

TROPICAL DEPRESSION ADVISORY
Issued at 05:55AM 03 January 2013

Stage: Tropical Depression. Time of Observation: 5.00 am, 3rd January 2013.

Location: Latitude 8.3 North; Longitude 124.4 East; approximately 123 km Southeast of Mindanao, Philippines.

Movement: Westwards at estimated speed of 45 kmph.

Distant from nearest town: Approximately 783 km Northeast of Semporna, Sabah.

Threat to Malaysia: These conditions may cause strong winds and rough seas over waters off Sulu Sea.

HEAVY RAIN WARNING (Orange Stage)
Issued at: 09:31AM, 03 January 2013

A Tropical Depression is observed at 8.3 North, 124.4 East with wind speed between 50-60 kmph. In conjunction to that, widespread thunderstorms are expected to occur over the states of Sabah: Divisions of Sandakan (Beluran, Kinabatangan and Sandakan Districts), Tawau (Lahad Datu District) and Kudat (Pitas, Kudat and Kota Marudu Districts) from tonight, 3rd January 2013 until Friday, 4th January 2013.

This condition will cause floods over low-lying areas and strong winds.

Appendix III.3

Examples of Heavy Rain Warning

Issued at: 06:12AM, 04 December 2013

SECTION A: HEAVY RAIN WARNING (ORANGE STAGE)

Updated at: 3:35 pm, 3 December 2013

Intermittent rain occasionally moderate occurring over states of Pahang (Kuantan, Pekan and Rompin Districts) and Terengganu (Dungun and Kemaman Districts) is expected to persist until Wednesday, 4 December 2013.

These conditions will cause floods over low-lying areas.

SECTION B: HEAVY RAIN ADVISORY (YELLOW STAGE)

I) Updated at: 3:35 pm, 3 December 2013

Intermittent rain occasionally moderate occurring over states of Pahang (Jerantut and Maran Districts) and Terengganu (Besut, Setiu, Kuala Terengganu, Marang dan Hulu Terengganu Districts) is expected to persist until Wednesday, 4 December 2013.

These conditions may cause floods over low-lying areas.

II) Issued at: 3:35 pm, 3 December 2013

Intermittent rain occasionally moderate is expected to occur over state of Kelantan (Tumpat, Kota Bharu, Pasir Mas, Tanah Merah, Machang, Pasir Puteh and Bachok Districts), Kedah (Sik, Baling and Padang Terap Districts) and Perak (Hulu Perak District) starting from Wednesday, 4 December 2013 until Thursday, 5 December 2013.

These conditions may cause floods over low-lying areas.

SECTION C: THUNDERSTORMS AND HEAVY RAIN WARNING

Issued at: 6: 12 am, 4 December 2013

Thunderstorms and heavy rain occurring over states of N. Sembilan (Port Dickson District), Malacca and Johore (Ledang, Muar, Batu Pahat, Kota Tinggi, Johor Bahru, Kulaijaya and Ponti an Districts) is expected to persist until Wednesday, 4 December 2013 noon.

The same weather condition is expected to occur over states of N. Sembilan (Jempol, Tampin and Rembau Districts) and Johore (Segamat, Kluang and Mersing Districts).

These conditions may cause strong winds and flash floods.

Issued by
Malaysian Meteorological Department
Ministry o/Science, Technology & Innovation
04 December 2013

Appendix III.4

Examples of Flood Warning

Kembaran C

JABATAN PENGAIRAN DAN SALIRAN MALAYSIA

Kedudukan aras air semasa

Kepada : Bahagian Keselamatan Negara
Pejabat Keselamatan Dalam Negeri dan Keselamatan Awam
YBhg. Datuk Ketua Pengarah JPS Malaysia
TKP I, TKP II
JPS Hidrologi Negeri Kelanatan

Negeri: Kelantan

Tarikh : 11 Disember 2004

Masa : 4.00 petang

Stesen Id	Nama Stesen	Tarikh	Aras Air	Waspada	Amaran	Bahaya	Aras Max	Catatan
5320490	Sg. Galas di Dabong	11.12.04	38.82	32.00		38.00		Aras air melebihi paras bahaya
5222490	Sg. Lebir di Tualang	11.12.04	37.90	27.00		35.00		Aras air melebihi paras bahaya
5521490	Sg. Kelantan di Kuala Krai	11.12.04	27.47	20.00		25.00		Aras air melebihi paras bahaya
5721480	Sg. Kelantan di Kusial	11.12.04	19.11	12.00		16.00		Aras air melebihi paras bahaya
6122490	Sg. Kelantan di Jeti Kastam	11.12.04	5.85	3.00		5.00		Aras air melebihi paras bahaya

JABATAN PENGAIRAN DAN SALIRAN MALAYSIA

Kedudukan aras air semasa

Negeri: Kelantan

Tarikh : 11 Disember 2004

Masa : 4.00 petang

Stesen Id	Nama Stesen	Tarikh	Aras Air	Waspada	Amaran	Bahaya	Aras Max	Catatan
5818490	Sg. Golok di Jenob	11.12.04	22.29	21.50		23.50		Aras air melebihi paras waspada
6019490	Sg. Golok di Rantau Panjang	11.12.04	9.20	7.00		9.00		Aras air melebihi paras bahaya

Nota : Dijangka paras air Sungai Kelantan di Kuala Krai, Kusial dan Jeti Kastam akan naik untuk tempoh 12 jam berikutnya.

Appendix III.5

Example of Tsunami Warning

Issued by Malaysian Meteorological Department
Ministry of Science, Technology & Innovation
at 05.30 pm 07 September 2011

Assessment

There is a widespread destructive tsunami in the Indian Ocean that can affect the coasts of Kedah, Perlis and Penang. Residents along the coast should evacuate to inland and follow further instructions from the authorities.

Estimated Time of Arrival

Coasts of Perlis	:	07:30 pm 07 September 2011
Coasts of Penang	:	07:45 pm 07 September 2011
Coasts of Kedah	:	08:00 pm 07 September 2011

A strong earthquake has occurred with these revised parameters:

Time of Occurrence	:	05.00 pm 07 September 2011
Coordinates	:	13.0 North 92.0 East
Location	:	Andaman Islands Region
Distance	:	104 km southwest of North Andaman, India
		1130km northwest of Langkawi
Magnitude	:	8.0 on Richter Scale
Depth	:	10km

The department will issue additional information on this event when detailed data for evaluation is available.

Appendix III.6

EXAMPLE OF SMS MESSAGE

"Tsunami Warning : Penang, Kedah & Perlis. Evacuate to higher ground and follow instructions from the authorities. Strong EQ 5:00pm 07/09/11 13.0N 92.0E Mag8.5 Dep 10km Andaman Islands Region, 104km SW of North Andaman, India. 1130km NW of Langkawi. MetMalaysia"

EXAMPLE OF TV CRAWLERS

A strong earthquake magnitude 7.9 on the Richter scale occurred off south Sumatera at 7.10 pm 12 September 2007. The center of the earthquake is located 718km from southwest of Johor Bahru. There were reports of tremors felt in Peninsular Malaysia. Coastal communities in Perlis, Kedah, Penang and Perak are advised to stay away from the beach or coastal areas.

The Malaysian Meteorological Department is monitoring the situation.

EXAMPLE OF PRESS STATEMENT

PRESS STATEMENT
6 MARCH 2007

A strong earthquake, magnitude 6.9 on the Richter scale has occurred in Southern Sumatra at 1:49 pm. on 6 March 2007. The epicenter of the earthquake is located at latitude 0.2 South, longitude 100.7 East, about 71 km east of northeast of Padang, Indonesia and about 324 km southwest of Malacca.

Several states in west Peninsular Malaysia such as Selangor, Melaka and Johor reported having felt tremors from the earthquake.

The Malaysian Meteorological Department is monitoring the earthquake event.

Appendix IV.1

Example of SOP (1)
SOP FOR HANDLING FLOOD DISASTER (NATIONAL SECURITY COUNCIL)

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Appendix IV.2

Example of SOP (2)

SOP FOR HANDLING TSUNAMI DISASTER (NATIONAL SECURITY COUNCIL)

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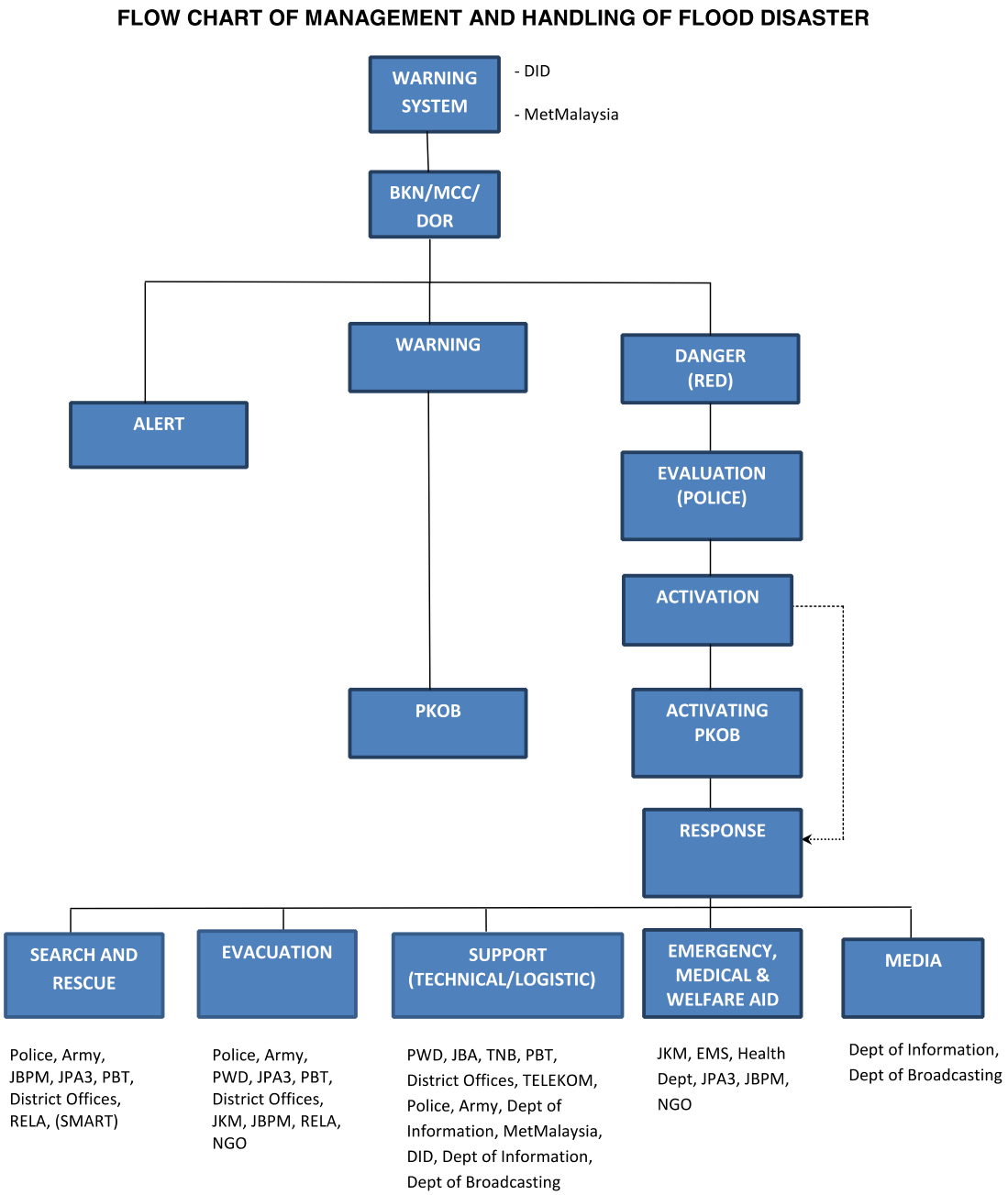
Appendix IV.3

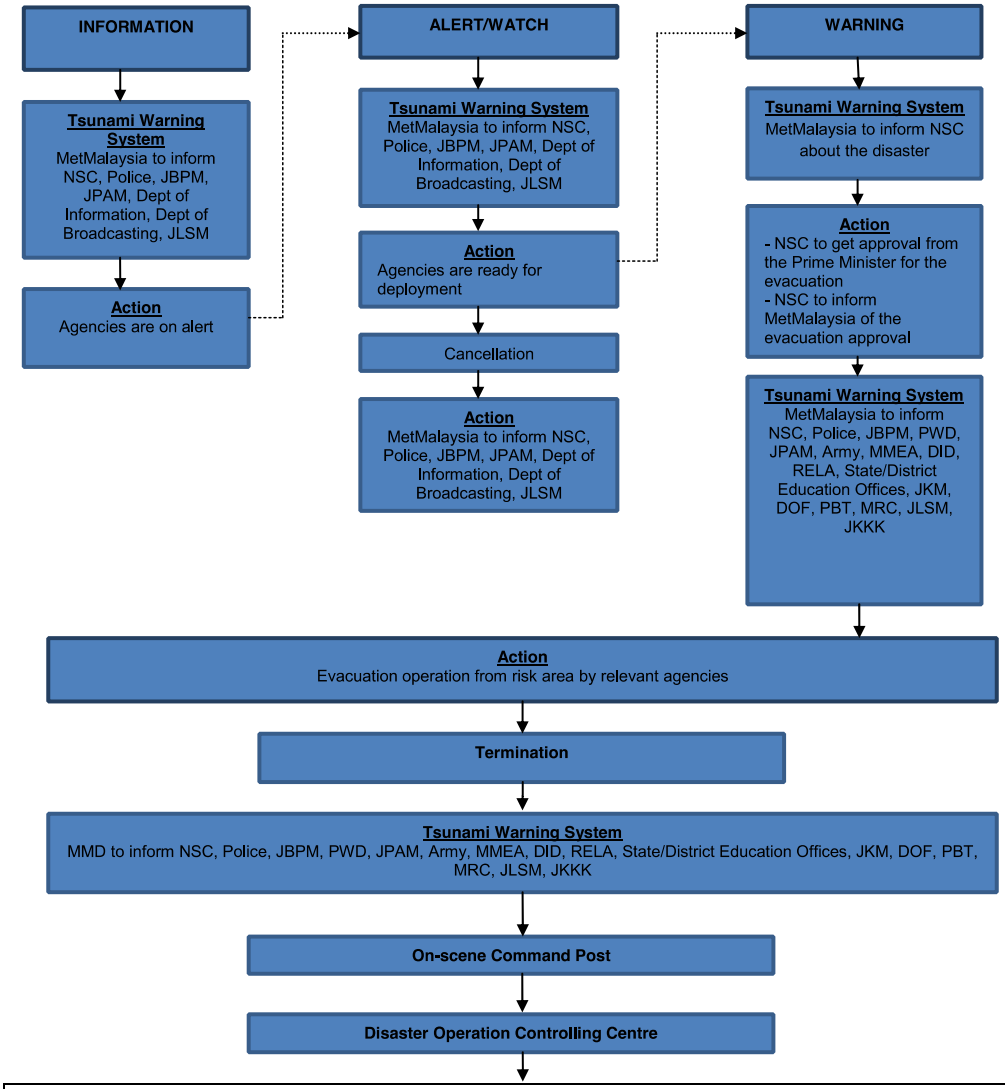
Example of SOP (3)
Malaysian National SOP on Flood Disaster



Appendix IV.4

Example of SOP (4)
Malaysian National SOP on Tsunami

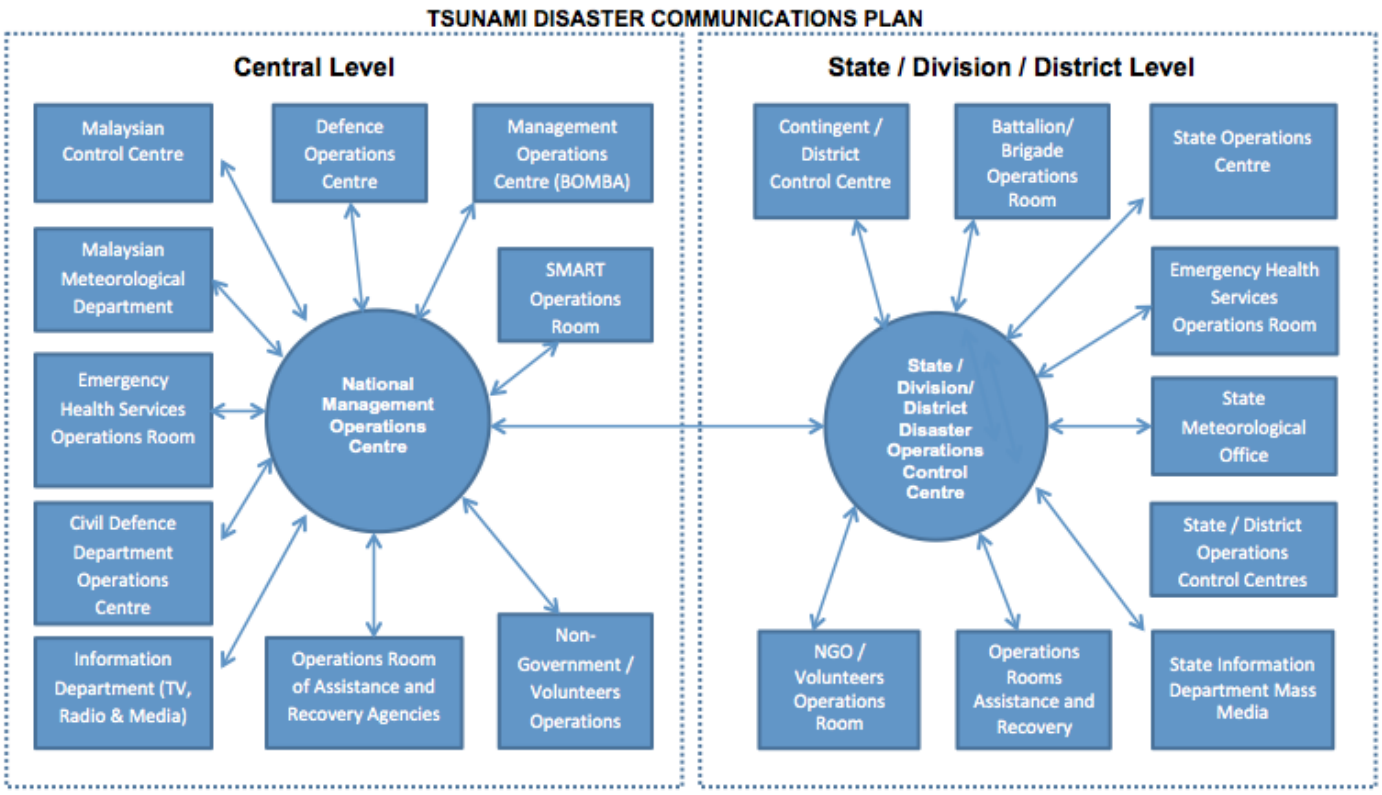
FLOW CHART OF MANAGEMENT AND HANDLING OF TSUNAMI DISASTER



Agencies Roles After Termination of Tsunami Warning					
SAR	**Welfare**	**Medical/Health Services**	**Media**	**Security Control**	**Technical/ Logistic Services**
- SAR - Evacuation - Emergency Medical Services	- Evacuation Centre - Foods & Other Aids - Counseling	- Emergency Treatment - Health Services - Public Health Services	- Dissemination of fast and accurate facts - Crawler - Press Release - Media Coverage (electronic/printed)	- Building/House Safety - Evacuation Centre Safety	- Recovery of basic needs (electricity, water, telephone) - Logistic - Communication - Expertise
Police, Army, JBPM, JPAM, Emergency Medical Services, SMART	JKM, JPAM, RELA, KPM, NGO	Emergency Medical Services, ATM, NGO	Information Dept, Broadcasting Dept, Media	Police, Army	District Offices, PBT, PWD, TELEKOM, TNB, SYABAS, JMG, MetMalaysia, DID, NGO

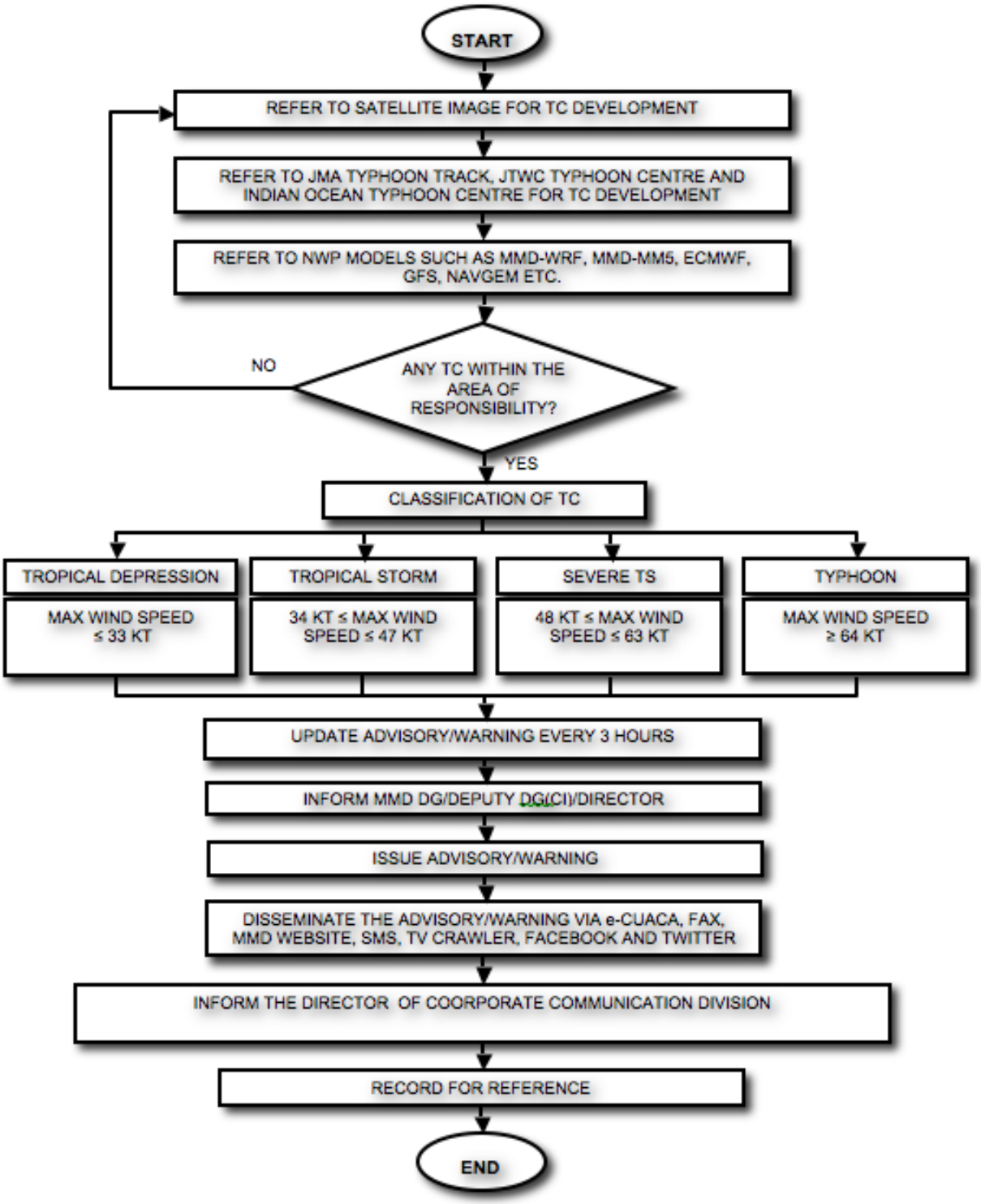
Appendix IV.5

Example of SOP (5)
Malaysian National SOP on Tsunami



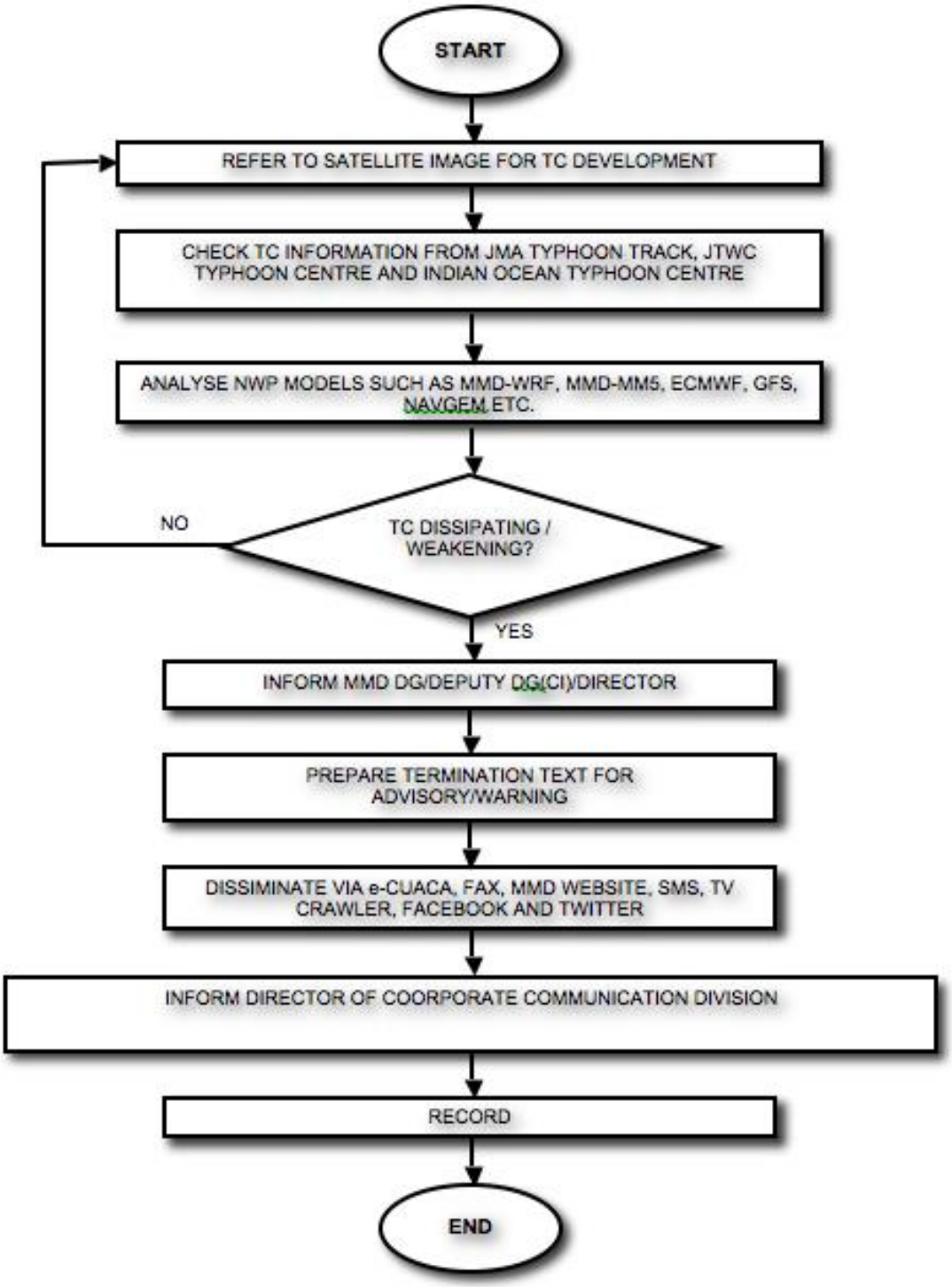
Appendix IV.6

Example of SOP (6)
Flowchart for Issuance and Dissemination of Tropical Cyclone Advisory/Warning



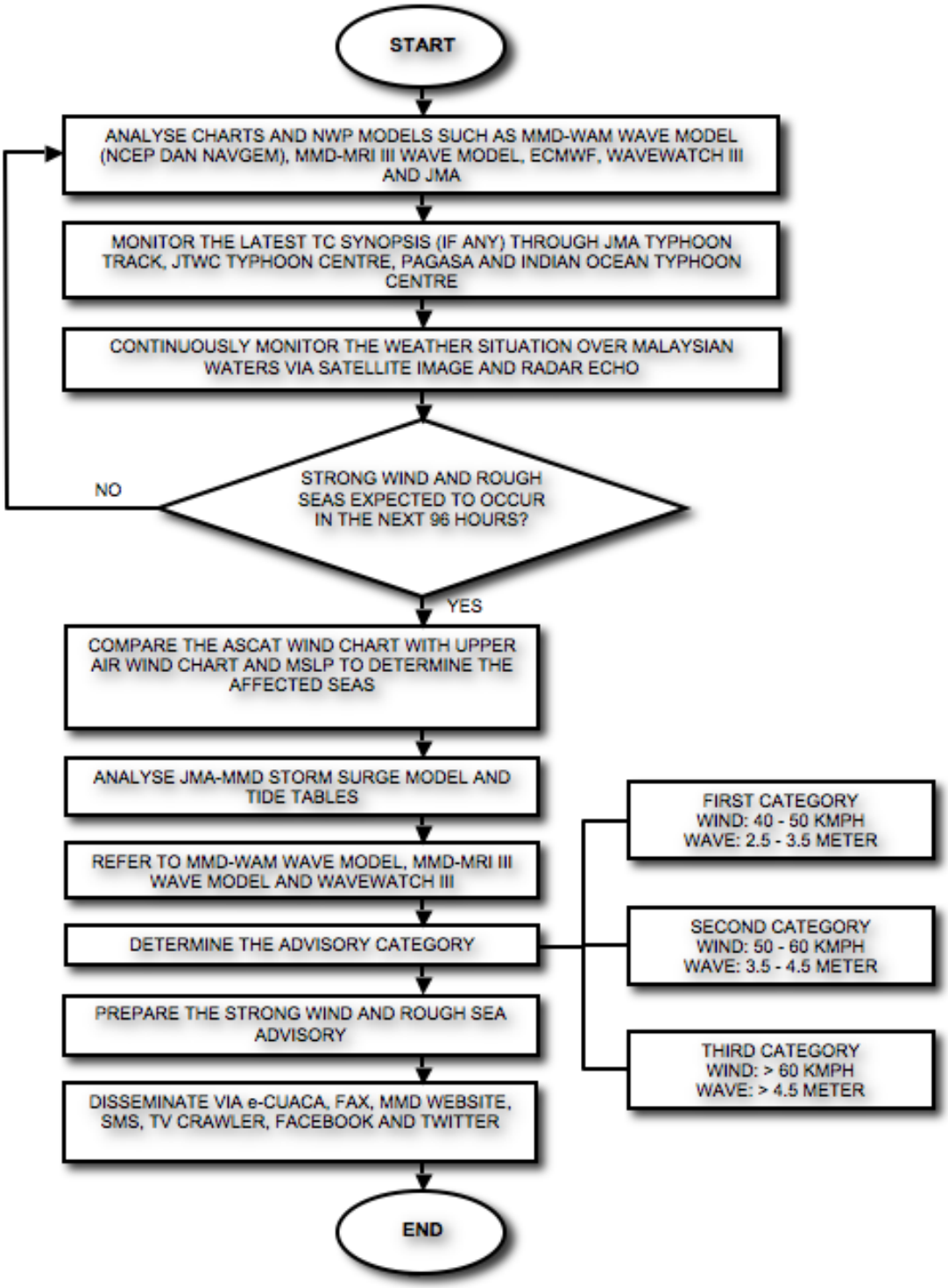
Appendix IV.7

Example of SOP (7)
Flowchart for Termination of Tropical Cyclone Advisory/Warning



Appendix IV.8

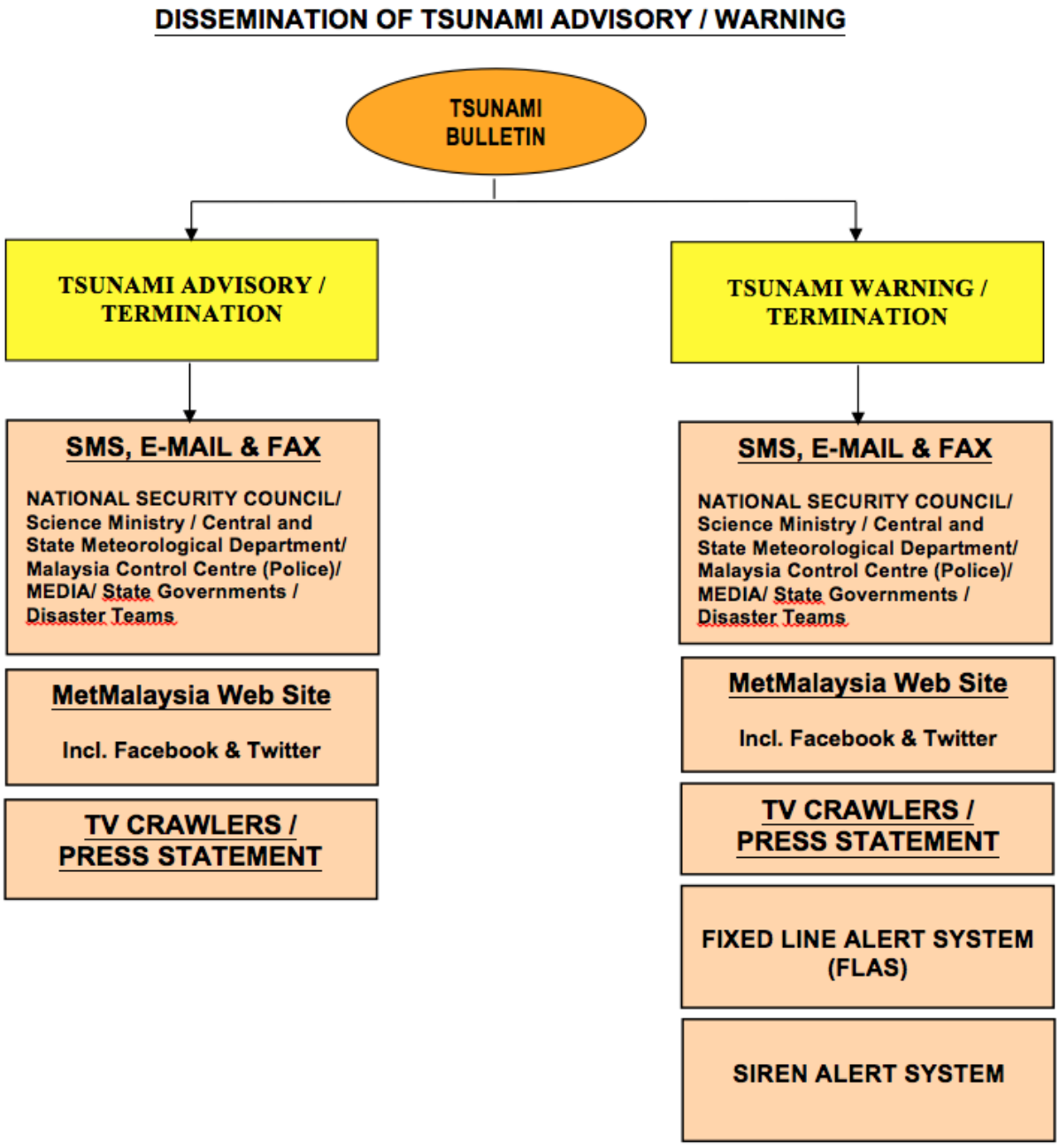
Example of SOP (8)
Flowchart for Issuance of Rough Sea Advisory and Warning



Appendix IV.9

Example of SOP (9)

Malaysian Meteorological Department SOP on Earthquake and Tsunami Alert



Appendix IV.10

Example of SOP (10)

Malaysian Meteorological Department SOP on Earthquake and Tsunami Alert

INSTRUCTION 2: WORK PROCESS FOR ISSUING TSUNAMI BULLETIN

Process	Action	Amendment Records
Check tsunami modeling data from TDRG/ IDMS/ WinITDB / TTT Software for Tsunami Estimated Time Arrival (ETA) **TSUNAMI IS LIKELY TO AFFECT MALAYSIA AND TSUNAMI ETA > 3 HOURS** 1. Issue **TSUNAMI ADVISORY** to relevant agencies (upon clearance from National Security Council). 2. Continue monitoring sea level data, buoy data, coastal camera and other report updates from PTWC/ JMA / RTSPs. **3.** If ETA ≤ 3, upgrade the **TSUNAMI ADVISORY** to **TSUNAMI WARNING.** 4. If a **TSUNAMI WARNING** is issued, trigger Tsunami Siren and activate Fixed Line Alert System (FLAS) according to the relevant risk area (upon clearance from National Security Council). 5. If Malaysia is not at risk, issue Tsunami Termination Bulletin (evaluation of sea level data confirms that a destructive tsunami will not impact the risk area).	Issue Tsunami Advisory Issue Tsunami Warning Trigger Tsunami Siren and activate FLAS Issue Tsunami Termination	

Appendix IV.11

Example of SOP (11)
Malaysian Meteorological Department SOP on Earthquake and Tsunami Alert

(see Separate "SOP on Earthquake and Tsunami Alert Ver. 2.0")

The Table of Contents is given below:

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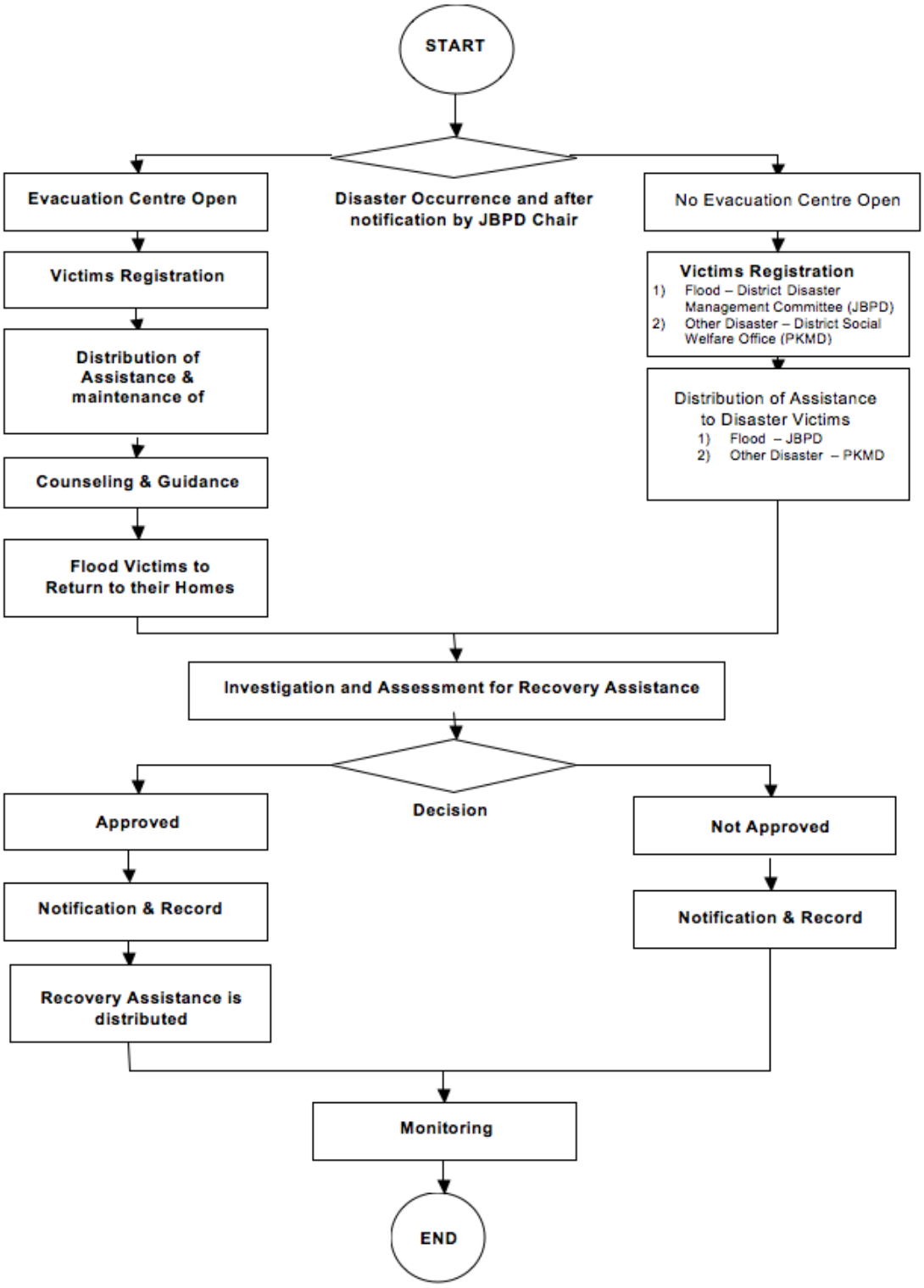
Appendix IV.12

Example of SOP (12)

FLOWCHART FOR DISASTER MANAGEMENT (Social Welfare Department)



Appendix IV.13

Example of SOP (13)
Guidelines for Media Management Center on Disaster/Crisis
(Information Department)

1. **Objective** - To underline the procedures for handling the Media Management Center (MMC)

2. **Situation at Disaster Site** - Media's presence to be seen as positive in assisting the Disaster Management Team to handle the situation

3. Directive No. 20: "Policy and Mechanism on National Disaster Management and Relief"

- Department of Information to set up and handle the Media Management Center at the scene

4. Media Management Center (MMC)

- To facilitate the mass media; and
- To assist the Disaster Operation Team (DOT) to channel the information to mass media for dissemination and broadcasting to the public.

5. **Implementation Strategy**

(a) To create close working relationship between MMC and Disaster Operation Commander (DOC) and local and international mass media;
(b) To broadcast accurate and latest information to the public through mass media about the disaster and actions to be taken by DOT;
(c) To seek collaboration from the local and international mass media for appeal announcement coverage to the public in seeking their cooperation on the disaster handling works by DOT;
(d) To regularly provide latest information to the victims' families so as to assist and guide them to go through the situation;
(e) To regularly inform the Disaster Relief and Management Committee on the progress of the work by DOT; and
(f) To prepare a log book to record the situations and sequence of incidents that occur at the disaster site.

6. Early Response of MMC

(a) While waiting for MMC to be fully operational after the disaster occurred, responsibilty for handling the media at the scene is by the Disaster Operation Commander (DOC);
(b) When the Department of Information Officer arrives at the disaster site, the Officer must immediately report to DOC and thereafter set up MMC;
(c) Duties of the MMC Officer immediately after reporting to DOC are:
    (i) To set up and operate MMC;
    (ii) To put up the directional signs and sign post of MMC at a strategic location at the disaster site for the local and international mass media;
    (iii) To request all the local and international media to register and provide them with the pass for access to MMC;
    (iv) To obtain the necessary information on the disaster from DOC for dissemination to the media. DOC must sign the information document before disseminating it;
    (v) To arrange the interview briefing or visit of the relevant government officials/leaders and media in a well-planned and scheduled manner; and
    (vi) To arrange the necessary equipment for the media.

7. Focus of MMC

(a) To ensure that media coverage be positive and impartial to all parties;
(b) To frame and prepare the response on the media's queries or appeal. To get assistance from relevant experts to answer to the media's unexpected questions or beyond MMC's expertise;
(c) To quickly understand the problems related to the disaster;
(d) To prepare a standard and safe answer to the media questions that could cause confusion if not answered accurately; and
(e) To give exposure to the public about the disaster through well-planned and latest media coverage.

8. Order and Control of MMC

(a) MMC must be handled by the Information Dept. District Officer where the disaster ocurred and the Officer is responsible to DOC of the On-scene Controlling Post;
(b) To assist the MMC Officer to implement their duties effectively, the MMC Officer can appoint an officer or expert from other relevant agencies.

9. Media Handling Procedures

MMC Officer must:
(i) Always be calm, polite and show high efficiency in handling the media;
(ii) Be friendly and readily accessible in assisting the media in obtaining the information;
(iii) Show no bias to all the media;
(iv) Coordinate the preparartion of the statement coverage text/news broadcasting in order to regain the public confidence espeially the victims' families; and
(v) Immediately channel the latest information on the disaster and current situation at the disaster site to the media.

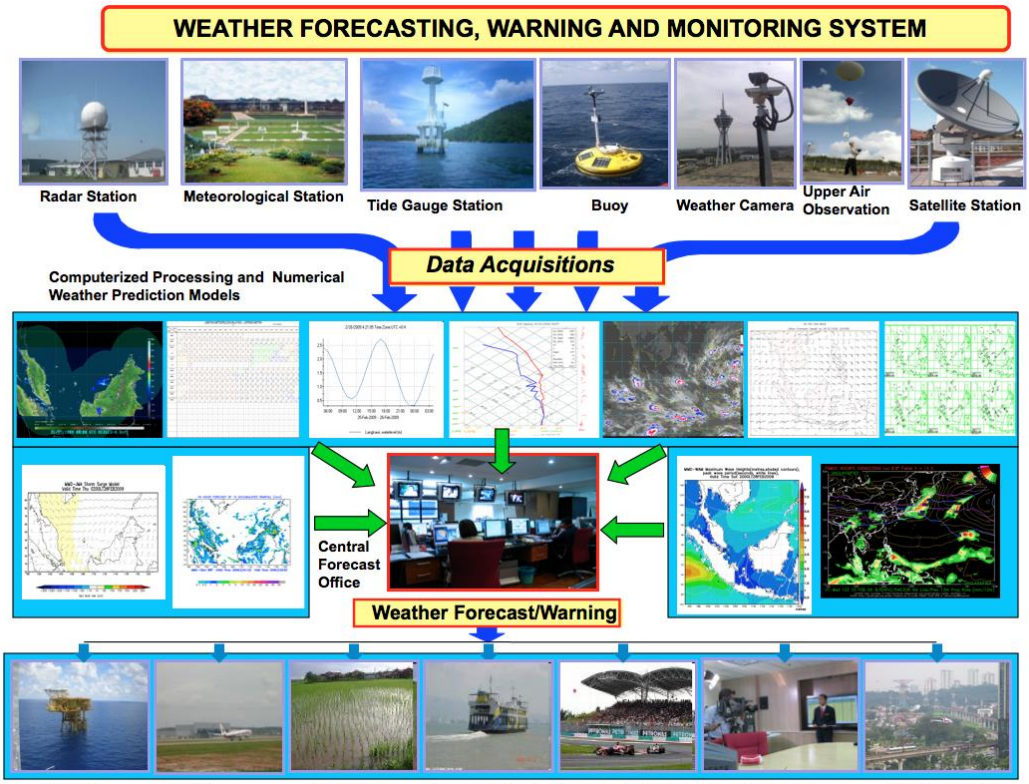
10. Duties and Responsibilities of MMC Officer

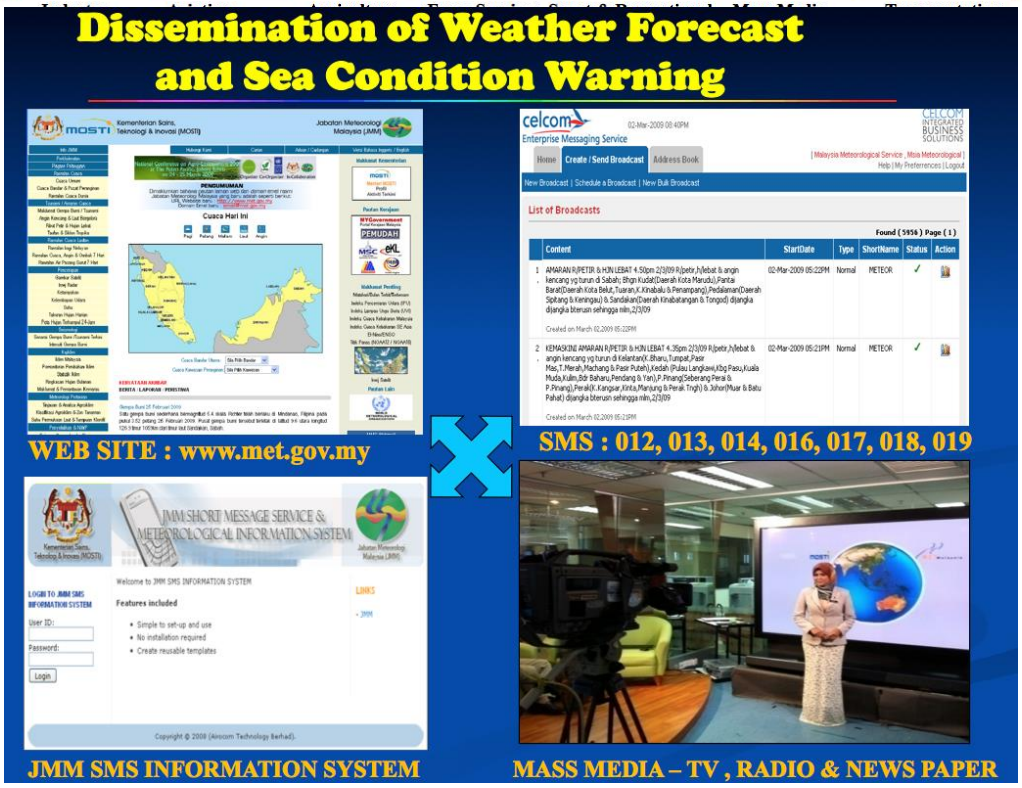
MMC Officer is responsible to DOC for performing the following duties:

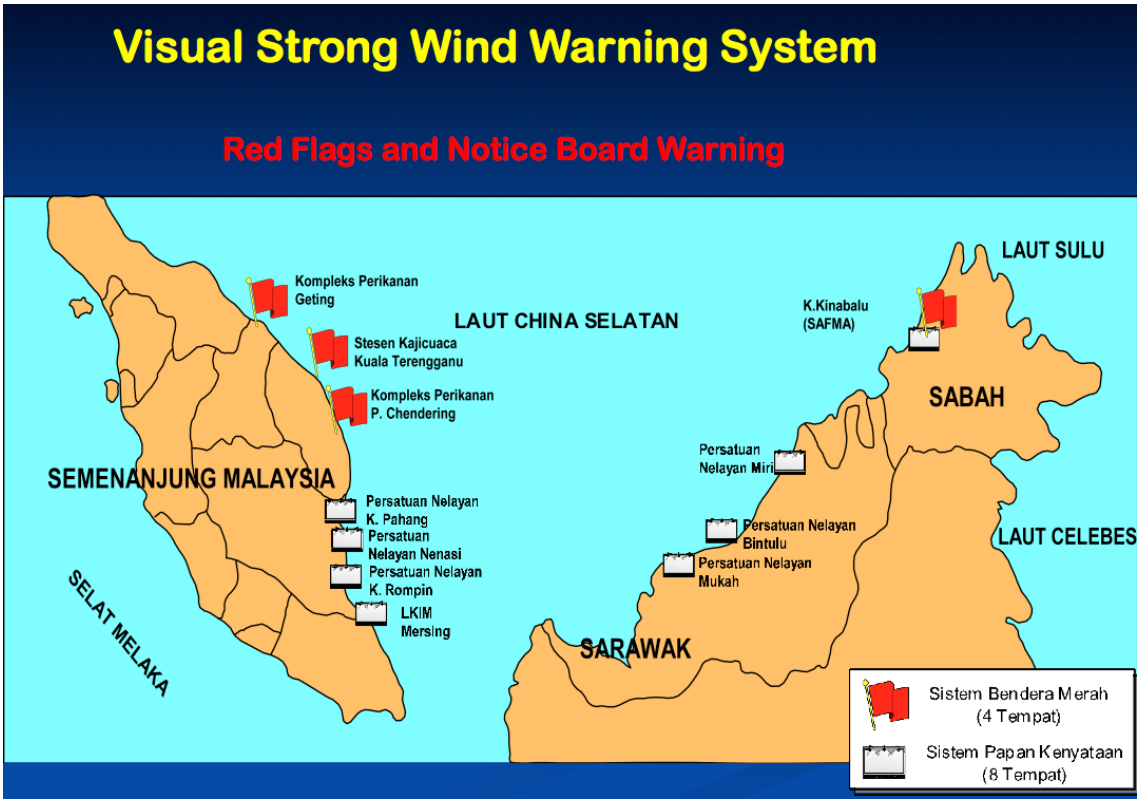
(a) To obtain the necessary information on the disaster anatomy including the actions to be taken for handling the disaster from DOC at the scene;
(b) To provide the news statement draft or news broadcasting on the disaster and obtain the decision from DOC before disseminating it to the media;
(c) To gather all the photographer and TV camera crew at a strategic spot (not too near to the disaster site) to enable them to take the photo comfortably and to enable the MMC Officer to control their movement;
(d) To arrange for the media the briefing session, interview or visit to the disaster site if the situation allows;
(e) To determine the appropriate techniques for dissemintation of the disaster information;
(f) To bring the media's attention to always abide to the ethics of journalists; and
(g) To act as Official Spokeperson for DOC at the scene.

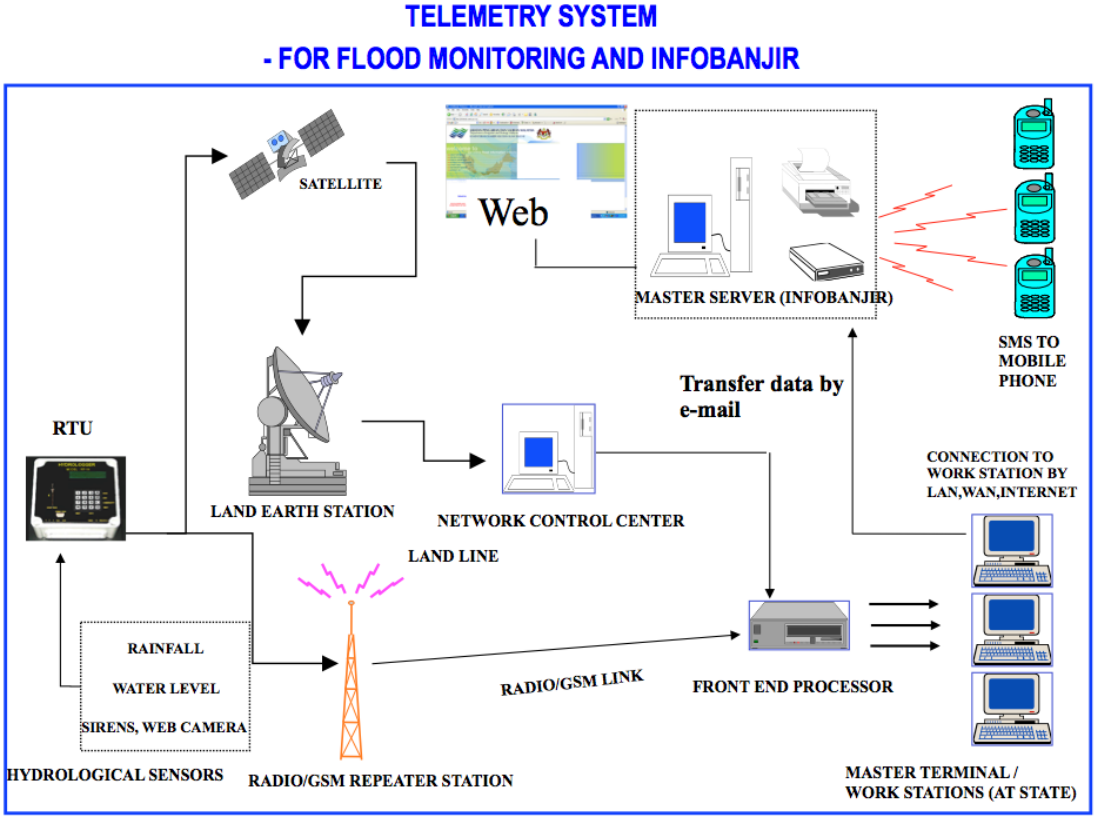
Appendix V

Pictures, Diagrams, flowcharts and ideas collected



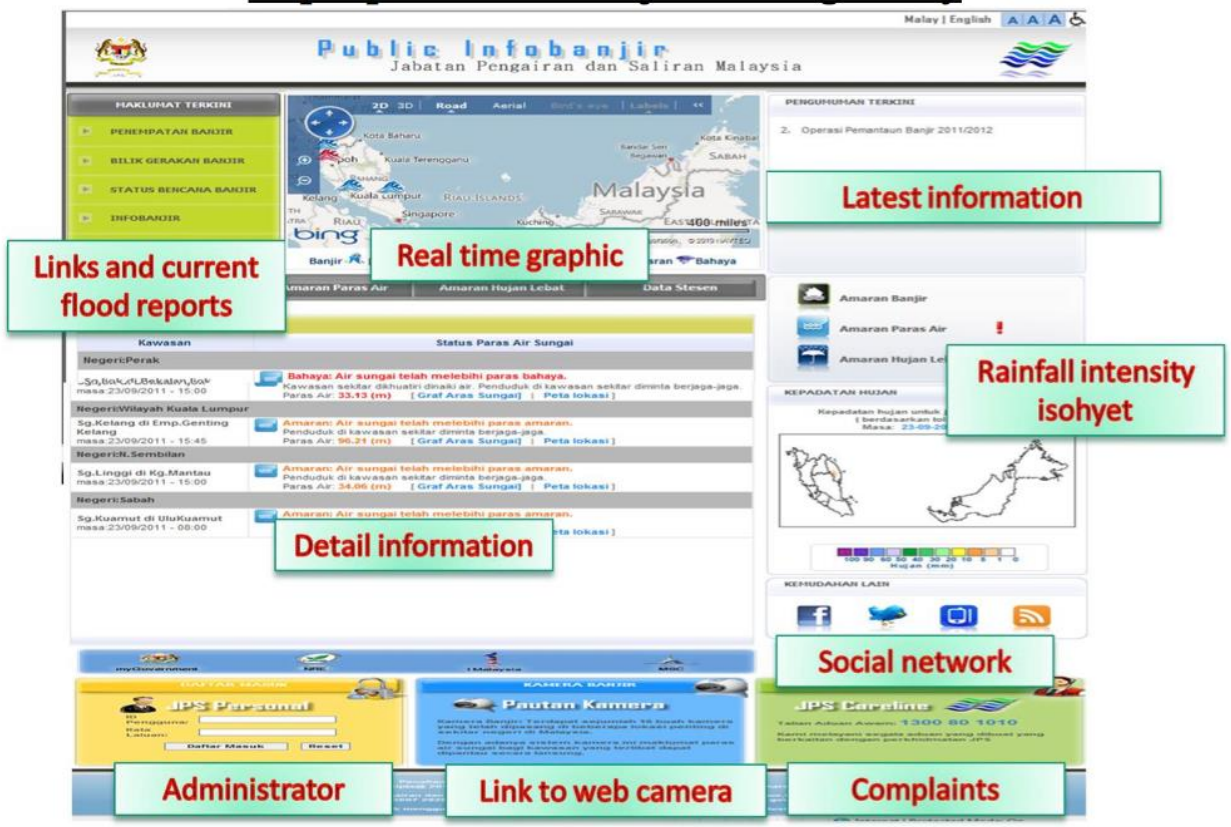


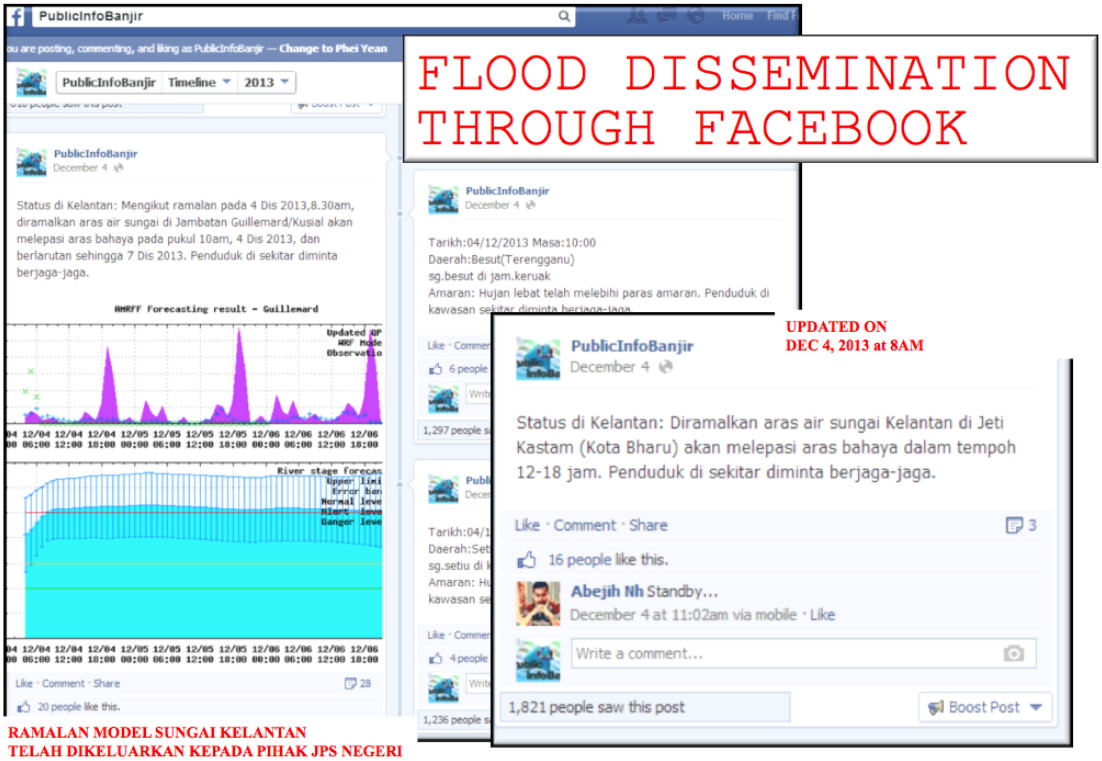

Visual Strong Wind Warning System
Red Flags and Notice Board Warning
Kompleks Perikanan Geting
Stesen Kajicuaca Kuala Terengganu
Kompleks Perikanan P. Chendering
LAUT CHINA SELATAN
SEMENANJUNG MALAYSIA
Persatuan Nelayan K. Pahang
Persatuan Nelayan Nenasi
Persatuan Nelayan K. Rompin
LKIM Mersing
SELAT MELAKA
LAUT SULU
K.Kinabalu (SAFMA)
SABAH
Persatuan Nelayan Miri
Persatuan Nelayan Bintulu
Persatuan Nelayan Mukah
LAUT CELEBES
SARAWAK
Sistem Bendera Merah (4 Tempat)
Sistem Papan Kenyataan (8 Tempat)


TELEMETRY SYSTEM
- FOR FLOOD MONITORING AND INFOBANJIR
SATELLITE
Web
MASTER SERVER (INFOBANJIR)
SMS TO MOBILE PHONE
Transfer data by e-mail
RTU
LAND EARTH STATION
NETWORK CONTROL CENTER
CONNECTION TO WORK STATION BY LAN,WAN,INTERNET
LAND LINE
RAINFALL
WATER LEVEL
SIRENS, WEB CAMERA
RADIO/GSM LINK
FRONT END PROCESSOR
HYDROLOGICAL SENSORS
RADIO/GSM REPEATER STATION
MASTER TERMINAL / WORK STATIONS (AT STATE)

Homepage for the public - 'Infobanjir Awam'

http://publicinfobanjir.water.gov.my





Appendix VI

List of Abbreviations

ABBREVIATIONS

AFTN	Aeronautical Fixed Telecommunication Network
API	Air Pollutant Index
ASEAN	Association of South-East Asian Nations
AWS	Automatic Weather Station
BDM	Basin Digitization Model
DADS	Decision and Dissemination Support Systems
DART	Deep-Ocean Assessment & Reporting of Tsunami
DID	Department of Irrigation and Drainage
DMRC	Disaster Management and Relief Committees
DOC	Disaster Operation Commander
DOCC	Disaster Operations Control Center
DOE	Department of Environment
DOT	Disaster Operation Team
DRC	Disaster Recovery Center
DRR	Disaster Risk Reduction
ECMWF	European Centre for Medium-Range Weather Forecasts
EEZ	Exclusive Economic Zone
ESCAP	Economic and Social Commission for Asia and the Pacific (UN)
EWS	Early Warning System
FLAS	Fixed Line Alert System
FY	Feng-Yun Satellite (China)
GIRN	Government Integrated Radio Network (Malaysia)
GFS	Global Forecast System
GTS	Global Telecommunication System (WMO)
INMARSAT	International Maritime Satellite System
ISO	International Organization for Standardization
IOC	UNESCO's Intergovernmental Oceanographic Commission
JKM	Social Welfare Department (Malaysia)
JMA	Japan Meteorological Agency
JTWC	Joint Typhoon Warning Center
KPI	Key Performance Indicators
MERS	Malaysia Emergency Response System
MMC	Media Management Center
MMD/MetMalaysia	Malaysian Meteorological Department
MONRE	Ministry of Natural Resources and Environment
MOSTI	Ministry of Science, Technology and Innovation
MOU	Memorandum of Understanding
MRC	Malaysian Red Crescent
MTSAT	Multifunctional Transport Satellite (Japan)
NAM	Nedbør-Afstrømnings-Model (Danish model for precipitation-runoff)
NAVGEM	Navy Global Environmental Model
NDMO	National Disaster Management Office
NGO	Non-Governmental Organization(s)
NMHS	National Meteorological and Hydrological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NSC	National Security Council

NWP	Numerical Weather Prediction
OSCP	On-Scene Command Post
PTC	(WMO/ESCAP) Panel on Tropical Cyclones
PTWC	Pacific Tsunami Warning Center
PWD	Public Works Department
RSMC	Regional Specialized Meteorological Centre (WMO)
RTM	Radio Televisyen Malaysia (Malaysia)
RTSP	Regional Tsunami Service Provider
SCMG	(ASEAN) Sub-Committee on Meteorology and Geophysics
SEADPRI-UKM	Ministry of Education and Southeast Asia Disaster Prevention Research Institute, Universiti Kebangsaan Malaysia
SMART	Special Malaysia Disaster Assistance and Rescue Team
SMS	Short Message Service
SOP	Standard Operating Procedure
SSOP	Synergized Standard Operating Procedures
TC	(ESCAP/WMO) Typhoon Committee
TCS	Typhoon Committee Secretariat
VSAT	Very Small Aperture Terminal
WIS	WMO Information System
WMO	World Meteorological Organization
WRF	Weather Research and Forecasting (model)

Abbreviations used in Appendices IV.3 and IV.4

BKN	National Security Division
DID	Drainage & Irrigation
DOF	Department of Fisheries
DOR	Defense Operation room
EMS	Emergency Medical Services
JBA	Water Supply Dept.
JBPM	Fire & Rescue Dept.
JKKK	Village Security and Development Committees
JKM	Social Welfare Department
JLSM	Marine Department Peninsular Malaysia
JMG	Mineral and Geosciences Department
JPA3	Civil Defense Department
JPAM	Civil Defense Department
JPBD	District Disaster Management Committee
KPM	Ministry of Education
MMEA	Malaysian Maritime Enforcement Agency
MCC	Malaysian Control Center
MRC	Malaysian Red Crescent
NSC	National Security Council
PBT	Local Authority
PKOB	Disaster Operation Controlling Center
PWD	Public Works Dept.
PKMD	District Social Welfare Office
RELA	People's Volunteer Corps
SMART	Special Malaysia Disaster Assistance and Rescue Team
SYABAS	Water Provider
TELEKOM	Telecommunications Provider
TNB	Malaysian Energy Provider