

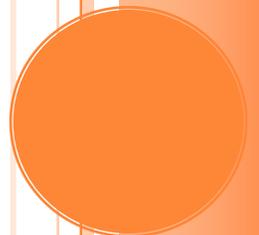
CONSULTANCY MISSION REPORT FOR VIET NAM

By

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6 October 2014

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 Viet Nam on 4-5 September 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 National Hydro-Meteorological Service (NHMS)



Participants in the Meeting with the Central Committee for Flood and Storm Control (CCFSC)



Participants in the Meeting with the Weather and Disaster Broadcast Centre of the Viet Nam TV

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 National Hydro-Meteorological Service (NHMS) 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 Centres; 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 Viet Nam was carried out on 4 and 5 September 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 Viet Nam was developed, as given below, in collaboration with members/participants from Viet Nam, 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 2:* Plenary Meeting on the Early Warning System in Viet Nam
- Session 3:* Meeting on the Questionnaire with participants representing warning services, DRR and media sectors
- Session 4* *Visit and Meeting with media (Weather and Disaster Broadcast Centre (WDB) of Viet Nam Television (VTV))*

Day 2

- Session 1* *Visit and Meeting with the Viet Nam Central Committee for Flood and Storm Control (CCFSC)*
- Session 2:* Meeting on the Questionnaire (continued) with participants representing warning services, DRR and media sectors
- Session 3:* Discussion on the recommendations for the SSOP Manual
- Session 4:* Summary of the Meetings and Results

5.2 The Plenary Meeting was opened by Mr Vo Van Hoa, Deputy Director, National Center for Hydro-Meteorological Forecasting (NCHMF) at 08.30 a.m. on 4 September 2014 with a brief

introduction of the SSOP project and of the participants and consultants. 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 insights into SOPs; and Tentative work programme and expectations from participants, with special emphasis on the importance of SOPs.

5.4 Meetings were organized to facilitate the discussions in specific areas, including meteorological and hydrological warning services; disaster risk management and role of media.

5.5 Discussions were made, based on the questionnaire response on: the existing EWS and SOPs in Viet Nam; the role of SOPs in the integration, collaboration, and coordination needed by the various agencies/organizations; and 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 Viet Nam

6.1.1 Viet Nam's location, in monsoon tropical zone of Southeast Asia and in the typhoon zone of the Western Pacific, makes it one of the most disaster prone countries of the world. Viet Nam has a long history of managing disasters originating due to monsoon rains, typhoons/storms, floods, flash floods, drought and other types of disasters, which are causing death, injury, crop and property loss and damage to infrastructure. Based upon topography, population characteristics and prevailing disasters/hazards, Viet Nam is classified into five distinct disaster/hazard prone zones as follows:

- (a) Northern Mountains: prevailing hazards include flash floods and landslides;
- (b) Red River Delta: prevailing hazards include monsoon river floods and typhoons/storms;
- (c) Central Provinces: prevailing hazards include typhoons/storms and flash floods;
- (d) Central Highlands: prevailing hazards include flash floods and landslides; and
- (e) Mekong Delta: prevailing hazards include river flooding from upstream and typhoons/storms.



6.1.2 To deal with recurring disaster events, Viet Nam has many laws and regulations, which play a significant role in reducing the impact of disaster risks and building safer and more resilient communities. The characteristic feature of DRR legislative framework in Viet Nam is its diversity, which covers many different mechanisms that are frequently updated. Each year, new legal mechanisms are issued to modify, replace and/or to add to already existing legislative framework. The legislative framework for DRR in Viet Nam is composed of more than 100 legal instruments/mechanisms in the forms of:

- The Constitution issued by the National Assembly;
- The Laws and the Resolutions issued by the National Assembly;
- The Ordinances and the Resolutions issued by the Standing Committee of the National Assembly;
- The Orders and the Decisions issued by the President of States/Provinces;
- The Decrees issued by the Government;
- The Decisions issued by the Prime Minister;
- The Circulars issued by the Ministers; and
- The Legal Acts issued by the People's Council and People's Committee (PC) (local government levels).

6.1.3 There is a new law entitled "*Law on Natural Disaster Prevention and Control*" (No. 33/2013/QH13, dated 19/06/2013), which came into effect on 1 May 2014. This law has brought many areas of DRR regulation under one umbrella law. [*The "Law on Natural Disaster Prevention and Control" is separately attached to this Report.*] The new Law has been adopted by the Viet Nam National Assembly in support of the Ministry of Agriculture and Rural Development (MARD). The primary impetus behind the development of the new DRR Law has been to bring together the main elements of the disaster response and risk management system in Viet Nam, which was based on a range of different legislative instruments focusing on natural hazards. The new DRR Law provides directions, among other things, for the following:

- To deal with all hazards prevailing in Viet Nam;
- To deal with all phases of disaster management cycle and adopts a comprehensive holistic approach;
- To establish a Central Steering Committee for Natural Disaster Prevention and Control (CSCNDPC) with a wider mandate than the currently standing the "Central Committee for Flood and Storm Control" (CCFSC);
- To further expand early warning to other hazards besides the flood and storms, and to all disaster/hazard zones;
- To provide direction for the zoning of natural hazards and references to "disaster safe/resilient construction against prevailing hazards";
- To mainstream DRR in all sectors of development by creating public awareness about different types of hazards prevailing in Viet Nam; introducing DRR-related education programmes into school system; and socio-economic and sectoral development;
- To construct disaster safe public buildings, which can be utilized as emergency shelter during emergency evacuations, etc.;
- To elaborate the rights and obligations of individuals with respect to DRR; and

- To provide policy directions to offer incentives and promote the use of insurance to recover from natural disaster losses.

6.1.4 The provisions of the new Law have not been fully implemented, as yet. It is expected that the new provisions will replace the already existing provisions paving a way for a robust DRR system in Viet Nam. Prior to the enactment of the new Law, there were several laws dealing with different aspects of DRR at national levels in Viet Nam. Description of few prominent mechanisms is given below:

- (a) The Legislation on Early Warning: The legislation clearly identifies responsibilities for different government agencies, which has contributed significantly to reducing the disaster risk of floods and storms in coastal and delta areas. The Law provides guidelines for the legal framework, which is implemented through the Central Committee for Flood and Storm Control (CCFSC). CCFSC had played a significant role in coordination and mobilization of resources for floods and storms risk management. In order to channelize early warning communications to communities, the Law has made provisions for establishment of active committees at national, provincial, district and commune levels. The Law provides compensation for individuals/households that suffer damage from natural hazards. The Law also fixes accountability of government officials for disaster risk management;
- (b) The Dykes Law: The Law has made strong provisions for strengthening the structural measures against floods and storms. These provisions clearly advocate for up gradation of dykes, drainage systems and construction of water reservoirs, etc.;
- (c) The Forest Law: The Law has provisions for safeguarding mangroves as physical barriers for coastal communities against storms/tsunami from the sea;
- (d) The Law on Construction: The Law ensures safety against earthquakes and storms; permits are required/issued for (multi-story) building construction in urban and rural areas for appropriate design and construction of safe buildings;
- (e) The Law on Land: The Law has provisions for using land use as a planning tool for effective DRR;
- (f) The Prime Minister's Decision on Earthquakes and Tsunamis Response: The Decision has significantly contributed to the prevention and mitigation measures, including the development of earthquake and tsunami risk maps. The earthquake and tsunami risks are dealt with by the Institute of Geophysics (IGP) of the Academy of Science and Technology of Viet Nam; and
- (g) The Legislation on Food Security: The Legislation has provisions for maintaining of food reserves against the events like drought, flood, storm or insect infestations at national level. There are provisions for distribution of basic food requirements across the whole population in such situations.

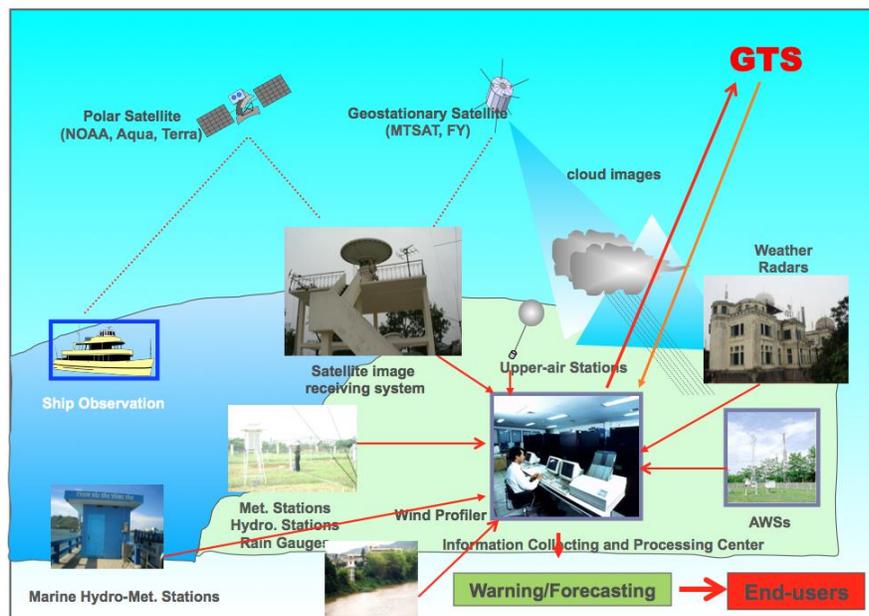
6.1.5 The current legal authority for disaster management in Viet Nam rests with the Central Committee for Flood and Storm Control (CCFSC) under the Ministry of Agriculture and Rural Development (MARD). The National Hydro-Meteorological Service (NHMS) of Viet Nam, under the Ministry of Natural Resources and Environment (MONRE) is the government agency responsible for the management of meteorological and hydrological services as well as issuing storm/typhoon and flood forecasts over the whole country. The Institute of Geophysics (IGP) under the Academy of Science and Technology of Viet Nam is the nodal governmental agency for earthquake and tsunami warning. CCFSC is responsible for receiving and processing/ disseminating warnings and forecasts, as well as for decision-making, coordination of disaster management activities, and directing emergency responses (see *Disaster Risk Reduction Aspects* below for details of CCFSC).

6.1.6 The Decision No. 77/2013/QD-TTg dated 24 December 2013 defines functions, responsibilities and organization of NHMS and the Decision No. 17/2011/QD-TTg dated 14 March 2011 provides the regulation on delivering/broadcasting tropical depression, storm and flood forecasts. [The “Decision No. 17/2011/QD-TTg” is separately attached to this Report.]

Meteorological Aspects

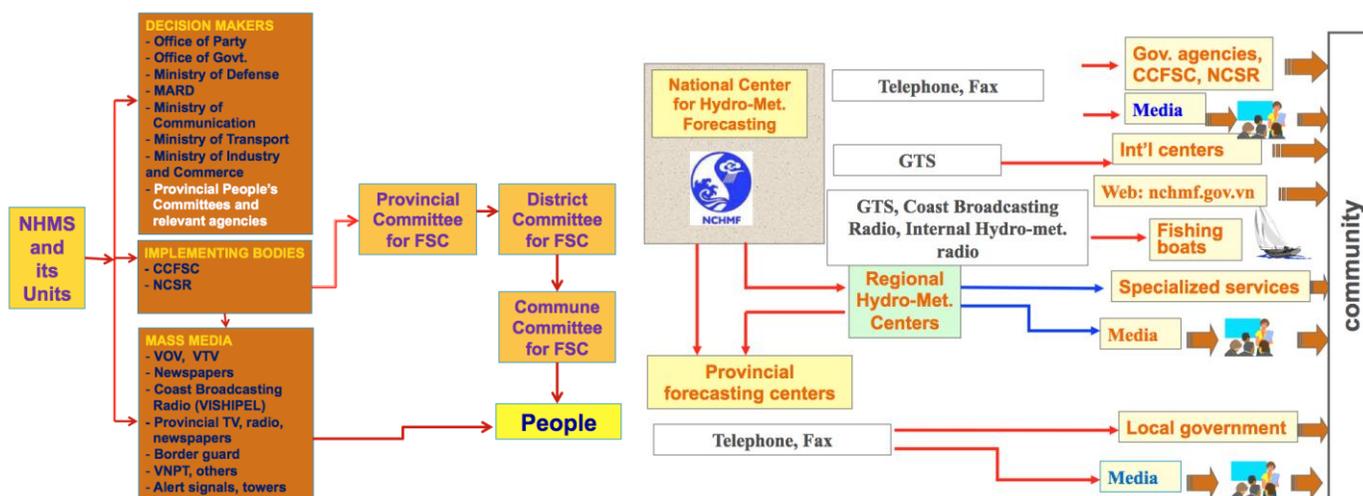
6.1.7 The major coastal natural disasters in Viet Nam include: flood and inundation; typhoon and tropical depression, and associated storm surge; flash flood; tornado; and tsunami. Among the seven institutional units of NHMS, the National Center for Hydro-Meteorological Forecasting (NCHMF) plays a key role in providing forecasts and warnings for severe weather. NHMS has local units composed of 9 Regional Hydro-Meteorological Centers; 54 Provincial Hydro-Meteorological Forecasting Centers and various meteorological observing stations. NHMS also has 236 hydrological stations and 18 marine meteorological stations.

6.1.8 The monitoring of severe weather is being made with 174 surface meteorological stations, 764 rain gauge sites, 6 upper-air stations, 6 weather radar stations (including 3 Doppler radars), and 1 satellite receiving and processing station for MTSAT-1R and Feng-Yun (FY)-2D and -2E geostationary satellites and for NOAA-series and FY-1D polar-orbiting satellites. The diagram on the right shows the hydro-meteorological data collection system in Viet Nam.



6.1.9 Functions of NHMS/NCHMF includes: typhoon analysis and forecast; short-, medium- and long-range weather forecasts; flood forecasts; and severe weather (heavy rain, cold surge, hot and dry weather, etc.) forecasts and warnings. The forecasting and warning services are made based on synoptic charts, satellite and radar images, and NWP products derived from deterministic and ensemble prediction systems (i.e., regional models such as HRM and WRF; and global model products from NCEP, ECMWF, JMA, DWD, CMC, etc.). NHMS/NCHMF provides warnings with two kinds of formats: text and map. A sample of the text and map formats for the Typhoon Warning is given in [Appendix III.1](#). Another example of flood forecast is given in [Appendix III.2](#). The warnings use the wording that indicates the time, places and potential risks.

6.1.10 The forecasting/warning bulletins are issued by NHMS forecasters and disseminated to the media (newspapers, TV, radio, etc.) and disaster management agencies and decision makers of the Government via telephone, fax and the Internet (Website and e-mail). The distribution list includes: CCFSC; the National Committee for Search and Rescue (NCSR); the Office of People’s Party; the Office of Government; the Ministry of Defense; MARD; the Ministry of Communication; the Ministry of Transport; the Ministry of Industry and Commerce; and provincial peoples’ committees and relevant agencies. The diagrams below show the communication flow (on the left) and the dissemination process from NCHMF (on the right).



6.1.11 Communication among disaster managers is made by: post; telephone; fax; the Internet (Website and e-mail); and teleconferencing. Communication between disaster managers and the public is made by television, radio, loudspeakers and the Internet (Website).

6.1.12 The information from CCFSC is provided to the provincial-, district- and commune-level Committees for Flood and Storm Control, and to the media, including TV (VTV and private channels) and radio (Voice of Viet Nam (VOV)), coastal network of radio transmission and the Viet Nam News Agency (VNA). Warnings are delivered, through messenger runners, to local communities who cannot access to the warning via the Internet, radio and television.

Hydrological Aspects

6.1.13 Flood and tropical cyclone are the most and second-most serious natural hazards in Viet Nam. Quite often, severe floods occur in connection with tropical cyclones causing the most devastating disaster situation. Flood season often stretches from June to October for the northern Viet Nam and from July to November for the central and southern Viet Nam. There are around 10 major rivers and almost 1,000 streams. The flood forecasting system is fully established on the Red River and the Mekong River. Rivers generally flow north to south and thus large scale flooding occurs along the southern coast. Approximately 15 flood events occur every year.

6.1.14 Flood forecasts are generated by the Hydrological Forecasting Division of NCHMF using a number of rain-runoff and flood routing models, including NAM, MIKE-11 and tank models. Flood forecasting accuracy is assessed regularly by NHMS. In the case of Hanoi, which is situated over the Red River, the forecast accuracy is around 85% for the short-range (24-hour) forecast; around 80% for the medium-range forecast (3-5 days), while 70% for long-range forecast. Upstream of Hanoi, the rainfall forecast is also used to get the necessary lead time for the flood forecast. The forecasted rainfall is based upon the output of NWP models. This provides the corresponding lead time enhancement of more than 2 days. However, currently, due to the construction of Dam upstream of Hanoi, only 24-hour forecast is possible. There are three major sub-basins and a total of about 195 river data recording stations providing the data for the flood forecasting system. Flood warning is issued in three stages from level-I (no danger, indicating that the river is flowing under normal conditions) to Level-II (dangerous flood situation) and to Level-III (very dangerous flood situation).

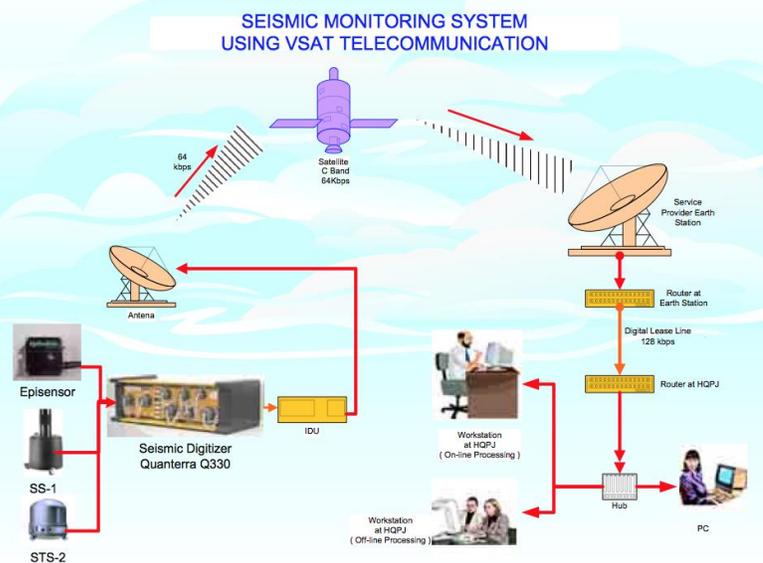
Pre-flood preparation

6.1.15 CCFSC under MARD looks after the maintenance of the river system. The Committee ensures that the river protection works have been duly carried out and that the river system is in good shape to withstand the impact of possible flood. Reservoirs are under the control of a hydropower company, which has its own SOP, with provisions for the pre-flood inspections, etc. Prior to the onset of flood season, flood preparatory meetings are held wherein all the flood-related organizations are called upon to ensure the implementation of the pre-flood actions as provided in their respective SOPs.

Tsunami Aspects

6.1.16 Seismic activities in Viet Nam is moderate or rather low. Ninety percent of earthquakes have taken place in the northwestern part of Viet Nam. However, most of earthquakes in Viet Nam were under Magnitude 5 and no tsunami has been recorded in the past. Tsunami with a height over 3 m (two hours after occurrence) is anticipated only under a scenario that an earthquake over Magnitude 8 occurred in the Manila Trench.

6.1.17 A seismological network was established by the Institute of Geophysics (IGP) of the Viet Nam Academy of Science and Technology to monitor seismic events of Magnitude larger than 3.0 in Viet Nam. IGP currently operates 24 seismic stations and 4 geomagnetic observatories in Viet Nam and uses seismic data from neighboring countries (China, Indonesia and Philippines) and the tidal data from 23 stations of NHMS. The Earthquake and Tsunami Warning Centre under IGP also receives tsunami information from JMA, PTWC and RIMES via fax, phone, the Internet (Websites) and SMS. The diagram on the right shows the seismic monitoring system using VSAT telecommunication.



6.1.18 The earthquake information and tsunami warnings are issued by the Earthquake Information and Tsunami Warning Center of IGP. The functions and tasks of IGP include: to observe and investigate geophysics; to manage the national seismological network; and to study the geophysical fields in Viet Nam. The dissemination is made by phone, fax, Website and e-mail to the media and disaster management agencies and decision makers of the Government (the same as that for severe weather, as given in paragraph 6.1.10).

Disaster Risk Reduction (DRR) Aspects

Viet Nam Strategy for DRR

6.1.19 Viet Nam has adopted a strategic approach for mitigation of water related disasters. The purpose of this approach is: to ensure that all flood mitigation issues are addressed; to prevent duplication of efforts; and to assist in the coordination of disaster mitigation activities. The approach adopted in Viet Nam advocates for a three-pronged system to mitigate the water-related disasters, with a strong emphasis on non-structural mitigation measures on a short- and medium-term basis. The approach adopted in Viet Nam emphasizes the following:

- Forecasting and warning systems: To prevent a natural phenomenon (hazard) from turning into a disaster by providing advance notice to potentially affected population. To this effect, physical warning systems and non-physical methods of public awareness, training and education are used;
- Preparedness and mitigation: To decrease the incidences of disasters, mitigation techniques along with up gradation and monitoring of emergency services are adopted. On one hand, there are structural measures like the construction of flood regulation/control reservoirs and the construction and maintenance of the dykes, etc. On the other

hand, there are non-physical activities throughout the country that include: development of water laws; introduction of insurance coverage against loss; schemes for generating funds for the self-financing of mitigation works; and institution building for water disaster preparedness; and

- Emergency relief: To minimize losses through physical stockpiling of equipment and other materials required for relief and rehabilitation. Such efforts are combined with training for effective emergency response. Non-physical relief measures include formation, staffing and training of a Disaster Management Unit (DMU). The DMU prepares plans for emergency management, develops procedures for mobilizing emergency relief and recommends strategies for rehabilitation.

6.1.20 Viet Nam's "First National Strategy and Action Plan for Mitigation of Water related Disasters" was prepared in 1994 through a national consultation process. It had identified the need for a multi-sectoral and multi-disciplinary approach to reduce the vulnerability of the country and improve its capacity to cope with the adverse impacts of natural hazards. It serves as a basis for preparation of annual state plans. The plan has strengthened institutions for disaster mitigation and management. The Second Strategic Action Plan (2001-2020) set up several strategies in disaster risk mitigation and management that aims to reduce disasters and their impacts on people, property, agriculture, economic well-being, environment, and sustainable development. It lays down responsibilities of various implementing bodies.

6.1.21 Viet Nam's primary DRR framework, "The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020" [*separately attached to this Report*], was approved by the Prime Minister on 16 November 2007. The strategy lays out Viet Nam's primary disaster risk management objectives, focusing largely on water related disasters. The main objectives of the national strategy are:

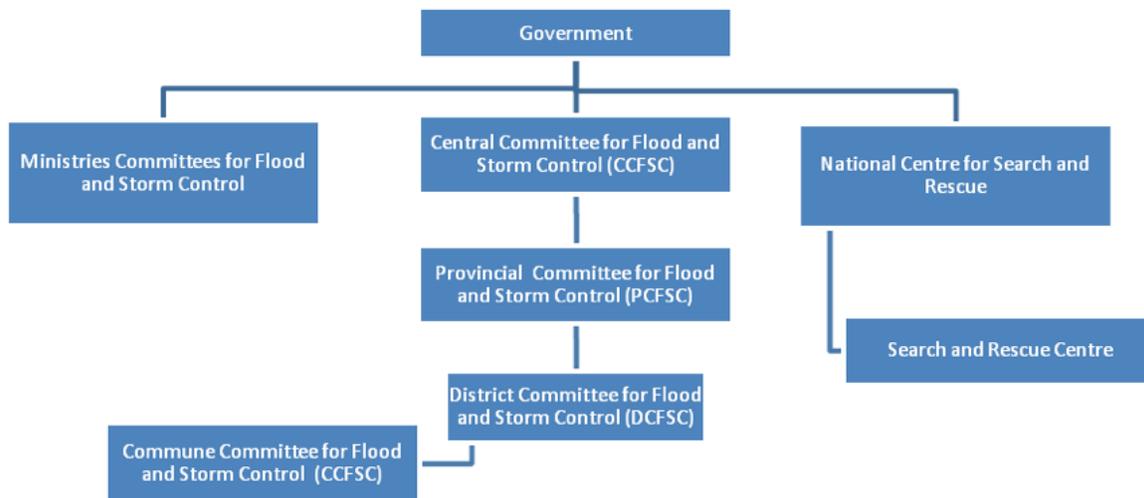
- To integrate disaster risk management into socio-economic development plans at national level with a focus on disaster response;
- To ensure sustainable disaster recovery, which integrates disaster risk management;
- To plan five different regional disaster risk management strategies for the five geographical regions; and
- To combine structural and non-structural measures in disaster risk management and dividing responsibilities (for risk mitigation and disaster management) and timing for risk reduction among a range of ministries.

6.1.22 The Ministry of Agriculture and Rural Development (MARD) has estimated that a budget of USD 18 billion is required to implement the National Strategy - 2020. Out of the total requirements, about USD 13 billion is required for structural measures, i.e., building reservoirs, dams and dykes, etc.; and USD 5 billion is required for non-structural measures. The proposed figure does not include funds needed by the other Ministries and provinces to implement disaster risk reduction action plans at their respective levels. [*The "Implementation Plan of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020" is separately attached to this Report.*]

Institutional Set Up

6.1.23 Viet Nam has one of the most developed national and provincial institutional, political and social structures in the world for managing water disasters. Such structures have evolved as a result of the experience gained in managing water related disasters for centuries. Moreover, several major institutional initiatives have taken place over the last few years to streamline the Government administration in charge of disaster management and to strengthen its ability to respond to natural disasters.

6.1.24 CCFSC is an inter-ministerial body having the legal authority to take actions, based on NHMS forecasts, to mitigate the effects of all types of natural disasters including storms/typhoons. The diagram below shows the flood and storm control and disaster mitigation network in Viet Nam.



Flood, Storm Control and Disaster Mitigation Network

6.1.25 CCFSC has representation at the highest level from all relevant Central Government agencies; and it has a comprehensive system of sister organizations spanning over the entire governmental set up from central to local government. For example, at the provincial level, the Provincial Committee for Flood and Storm Control (PCFSC) is chaired by the Chairman or the Vice Chairman of the Provincial People’s Committee; the standing offices of these provincial committees under the provincial Departments of Agriculture and Rural Development (DARD) are responsible for dike management and flood control. Their tasks include the preparation of flood mitigation and relief plans.

6.1.26 Prior to its upgrading to ministerial level, CCFSC was mainly responsible for disaster preparedness, particularly dike monitoring and emergency repair. At present, CCFSC is in charge of all phases of disaster management, including disaster mitigation and post disaster rehabilitation.

6.1.27 At the national level, the day-to-day work of disaster management is performed by the Standing Office of CCFSC. The Standing Office is managed by the Department of Dike

Management and Flood Control (DDMFC) of the Ministry of Agriculture and Rural Development (MARD).

6.1.28 DDMFC of MARD has been renamed as the “National Center for Disaster Management” with new broad powers to plan and implement for all aspects of disaster management actions at national level. At present, there are two National Centers for Disaster Management located at Ho Chi Minh City (for South) and Hanoi (for North).

Communication Strategy

6.1.29 CCFSC has the communication strategy to ensure that all warning messages are sent on time to the public and local emergency management committees. The local emergency management committees have their own authorized staff and volunteers who can go directly to meet the people (who cannot receive the warning messages) in order to warn them of the coming hazards. CCFSC teams, from time to time, go to assess the disaster situation, and also get feedback from local people about the functioning of the warning system. CCFSC makes phone calls to the local officials (immediately after the event). During a hazardous event, the Government requests for private sector resources (e.g., amateur radios and safety shelters) in providing/disseminating/receiving/processing hazard warnings to the public.

Response

6.1.30 The post-hazard impact assessment is made by CCFSC, which collects data of loss of life and property. At the local level, local and people’s committees are involved in collecting damage data. CCFSC at national and local levels has their coordinated procedures/MOUs. An example of the Summary Report on damage caused by disasters in Viet Nam in 2008 is given in **Appendix V**. CCFSC uses traditional methods for post disaster damage assessment. PCFSC and various Ministries collect relevant information and send their reports to CCFSC for compilation. CCFSC has concluded an agreement with the World Bank and UNDP to modernize post-disaster damage assessment procedures including training of relevant staff.

Media Aspects

6.1.31 The Viet Nam Television (VTV) is the governmental nationwide broadcast station in Viet Nam, which is an official member of CCFSC. VTV is the official and number-one media channel on natural hazard/disaster broadcasting and warning, which covers about 90 million (i.e., almost 100%) of Vietnamese people.

6.1.32 With the aim of being the sole Vietnamese agency that delivers weather news and disaster warning in a professional and systematic way, VTV has established the Weather and Disaster Broadcast (WDB) Center in 2013. At present, the VTV-WDB Center has 40 staff members (technicians, media personnel and meteorologists) and a large number of provincial collaborators. The Center produces 40 weather bulletins per day on all VTV channels, in which 10 newsletters with the host/presenter (specialized in, among others agriculture, travel and international matters) and 30 with visual information only. The Center plays another important role in disaster warning through a number of breaking news sessions. In the near future, the

Center is expected to produce breaking news sessions on all weather-related hazards, including floods, storms, tornadoes and heat waves. The Center started a hot line for extreme conditions. VTV uses sign language to communicate with the people who have hearing disabilities.

6.1.33 With close cooperation with NHMS, the on-line data transfer protocol was established to obtain observational data and information, including satellite images and NWP products, from NHMS in real time. The Center also receives forecast bulletins three times a day, updating the latest development. The news bulletins are tailored to be easily understood and to describe what the audience should care about. The Center also runs a series of public educational programmes with the purposes of spreading know-hows and improving disaster mitigation process. Q&A sessions with invited experts are organized on special occasions.

6.1.2 Good Practices/Strengths

6.1.34 Traditionally, Viet Nam has focused on preparedness and response for water-related disasters with a strong emphasis on structural measures such as dykes and seawalls construction. To meet the challenge of disaster risk management, non-structural measures are slowly percolating into the development agenda of the Government to the extent that now approximately 1.5% of the GDP is being spent on hazard mitigation.

6.1.35 There are many effective DRR mechanisms in Viet Nam, which are supported by legal frameworks developed over time, and provide detailed institutional framework, implementation methods, allocation of financial resources, and clearly defined roles and responsibilities.

6.1.36 The legislative framework has provisions for providing compensation for individuals/households that suffer damage from natural hazards. The Law also fixes accountability of government officials for disaster risk management.

6.1.37 At present, Viet Nam does not have “Meteorological Service Act”, but NHMS is expected to submit the “Law of Hydro-Meteorology” to the Viet Nam Parliament in the near future. NHMS has a multi-hazard plan to implement “The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020”.

6.1.38 NHMS/NCHMF has a verification division that is responsible for verifying all forecasting/warning bulletins issued by the National Center, Regional Centers and Provincial Centers. The verification procedure is implemented weekly, monthly and annually. It would be more efficient if the verification could also be made by key disaster management agencies and the media (users) with reference to the products of other developed NMHSs and through surveys.

6.1.39 In NCHMF and the Earthquake Information and Tsunami Warning Center of IGP, the staff is always present on a 24-hours-a-day and 7-days-a-week (24/7) basis. Similarly, the nine Regional Hydro-Meteorological Centers run forecast on a 24/7 basis in stormy and flood seasons.

6.1.40 Viet Nam has a fail-safe communication system for collection and dissemination of coastal hazard information and warnings. The Intranet network, i.e., wide area network (WAN),

is exclusively used for this purpose. This forms an excellent technical basis for the disaster risk management in the country.

6.1.41 In the area of flood forecasting and warning, the following are considered as good practices:

- Use of the rainfall forecast is made to enhance the early warning lead time;
- Reservoirs upstream of Hanoi are used for the mitigation of the flood peak downstream and thus are a major flood safety source for the city of Hanoi;
- Flood safety measures before and after a flood hazard are duly provided for under the SOPs and are being practiced;
- During the flood season, hourly data of river levels at 32 key stations (out of 248 stations) is passed on line to the CCFSC;
- A good network of 6 rain-monitoring radars (with a plan to expand the radar network to 15 radars by 2020) exists. This constitutes an important component of flood data monitoring system; and
- Six dams on the Red River are effectively used for flood mitigation purpose including 4 dams upstream of Hanoi, which are part of the Hanoi flood safety system.

6.1.42 A special nationwide TV station (i.e., VTV) dedicated to the natural hazard and warning is in place. The Weather and Disaster Broadcast Center (WDB) under VTV broadcasts the weather- and disaster-related bulletins, including floods and storms. The station is a single official source and gives intensive coverage to the hazard-related information including the discussions and interviews so as to provide greater insights into the causes and impacts of the natural hazards. The general public is satisfied with the hazard-related information provided by VTV-WDB, with a high level of credibility.

6.1.43 A good training system on hazards exists in Viet Nam for media and the public. NHMS organizes annual training programmes for the media to draw attention to: basic knowledge about hazards; how to understand the warning; how to respond; how to prevent and/or prepare for disasters, etc. NHMS also disseminates flyers to the public in order to propagate basic knowledge about hazards/disasters.

6.1.3 Gaps and Needs/Challenge

6.1.44 NHMS currently uses its own conventional and non-conventional observation networks along with its own communication system for hazard monitoring, data collection and warning dissemination. However, the hazard-monitoring network is not dense enough to observe natural hazards in small scales such as thunderstorm, especially when a hazard is active in the East Sea. There is still a need for further improvement of observation network and communication infrastructure to improve the quality of hazard monitoring and to facilitate timely data and information collection and sharing. NHMS has a need for sufficient budget for operation and maintenance of the early warning system and for human resources development (both quality and quantity).

6.1.45 The observational and collected data and information at NHMS are shared with other disaster management agencies via WAN, Internet, telephone and fax, however, the media (e.g., TV) do not fully utilize the satellite/radar images. Satellite images are shared only with VTV (not with other TV stations), and even VTV does not use the radar images on their TV bulletins due to technical reasons on the NHMS side. According to the NHMS's modernization plan for the observing station network, the coastal radar stations will be increased from 6 to 15 (all Doppler radars) to cover the whole country. The provision of radar images to VTV-WDB will be made after completion of the modernization of radar stations, possibly in 2020.

6.1.46 There is a need to develop the flood risk maps so as to enable the establishment of the flood plane-zoning scheme in respect of the major flood prone areas. Similarly, the storm surge inundation risk maps, and earthquake and tsunami risk maps, etc. should be developed. The hazard risk mapping shall increase the public awareness about the prevailing hazards and associated risks. It shall constitute a major step forward in reducing the loss of life and property in case of major disasters.

6.2 Standard Operating Procedures

6.2.1 There exists some key Law and Decisions as listed below designating standardized process and specific roles and responsibilities for warning issuers, disaster management agencies, decision makers and media:

- (a) Law No. 33/2013/QH13 on Natural Disaster Prevention and Control (effective on 1 May 2014);
- (b) Decision No. 77/2013/QD-TTg (dated 24 December 2013) on promulgating “functions, responsibilities and organization of the National Hydro-Meteorological Service under the Ministry of Natural Resources and Environment of Viet Nam”; and
- (c) Decision No. 17/2011/QD-TTg (dated 14 March 2011) on promulgating the Regulation on “delivering/broadcasting the tropical depression, storm and flood forecasts”.

6.2.2 These law and decisions form the bases for standardized procedures for operation of individual DRR-related agencies. All the concerned ministries/agencies/organizations have their own SOPs for their assigned tasks. For example, NHMS has its SOPs for natural hazard forecast, CCFSC has its SOPs for warning dissemination and final decision making, and IGP has SOPs for tsunami and earthquake warning. CCFSC as well as its local Committees such as PCFSC have their own SOPs to handle different coastal hazards.

6.2.3 Specifically, the IT Center of NHMS has its own detailed SOPs for collecting, processing, sharing observation data with other related units (internal and external). NHMS follows the operational forecasting procedures on handling international and regional data, e.g., for decoding, processing and displaying products. NHMS and IGP have separate SOPs for each natural hazard, such as tropical storms, floods, heavy rains, gale/strong wind, heat waves, cold surges and tsunami. These detailed technical SOPs describe operational procedures to guide forecasters to create warning messages. An example of Standard Operational Procedures for Tropical Storms (criteria of signal levels) is given in **Appendix IV.1**. Two other SOP examples: (a) Flowchart for

short-range forecasting procedure for tropical cyclone; and (b) Flowchart for hydrological forecasting procedure are presented as **Appendices IV.2 and IV.3**. **Appendix IV.4** and **Appendices IV.5 and IV.6** show diagrams of short-range forecasting procedure and of flood forecasting procedures using different models, respectively. *[A very detailed “SOP of NCHMF to guide weather forecasters in thunderstorm forecast” (in Vietnamese) is separately attached to this Report.]*

6.2.4 With regard to dissemination/communication, NHMS has detailed SOPs for warning dissemination. In order to ensure the effective implementation of these SOPs, NHMS has a detailed cooperation agreement with related agencies in disseminating hazard warning. For example, in typhoon forecast, NHMS has a cooperation agreement with CCFSC and VTV which shows out what time warnings have to be disseminated, who will receive the warning first, the communicating way to use, etc.

Media Aspects

6.2.5 The WDB Center of VTV does not have well-documented SOPs. Based on several scenarios and through internal meetings, the Center works with flexibility (as the nature of journalism). An example of VTV-WDB standard operating procedure (diagram) is shown in **Appendix IV.7**. The Center has its own training programme for their staff on meteorology. NHMS provides training courses and conferences to journalists, TV broadcasters about the accuracy and uncertainty of the warning to enhance the credibility of the warning.

6.2.6 Collaboration is established between the VTV-WDB Center and other TV stations in foreign countries, especially with the Philippines after the event of Typhoon Haiyan. VTV has a MOU with a weather company in US (Weather Company - WSI (see: www.wsi.com)) on the provision of the equipment.

Cross-cutting, Integrated and Coordinated Aspects

6.2.7 The warning providers, disaster risk management bodies and media have a coordinated agreement/SOPs for communication during a disaster event. There are provisions for providing annual budget to upgrade and maintain the communication system. The coordinated SOPs indicate the responsibilities of each partner in providing/disseminating/receiving/processing disaster warnings, etc.

6.2.8 The delivery of warning notification and information to the last mile is ensured through two-way interactive communication systems, e.g., telephone and the Internet. VTV-WDB plans to use “social media” for confirmation of receipt of the warning bulletins.

6.2.9 During a disaster event, non-governmental, people-centered, community-based organizations, such as the Red Cross Society in Viet Nam, play an important role in: coordinating with governmental agencies; delivering warnings; collecting information about loss of life and property damage; helping injured people; and distributing relief goods (food, clothes, etc.). NHMS, IGP and CCFSC have MOUs or agreements with the Red Cross Society. All non-governmental, people-centered, community-based organizations are also involved informally in

capacity building and non-structural activities. There are no formal MoUs or agreements with such organizations.

SOP Development, Documentation, Monitoring, Review and Training

6.2.10 There are no standard formats used to develop SOPs to ensure standardization. All SOPs have always a historical record after cover or content pages. The historical record includes information on: when is revised; what step is newly added; short description about the revised content; and who revised. After every revision, concerned staff is trained in those aspects.

6.2.11 NHMS, IGP and CCFSC have testing and monitoring procedures for implementing their SOPs as given in Law No. 33/2013/QH13. CCFSC organizes annual practices/exercises in which all governmental agencies/committees on disaster prevention, along with the public, test the current SOPs and ensure that all steps of SOPs are effectively implemented. In these practices, the synthetic situations are given out and governmental agencies/committees of disaster prevention have to issue final decisions based on their SOPs. Through the annual practices, all governmental agencies/committees of disaster prevention can find out the gaps in SOPs and revise them accordingly.

6.2.12 An annual evaluation and review system is established on the effectiveness of SOPs through the evaluation of decrease in human and property damage. The Government or Agencies who approved SOPs normally implement the evaluation and review annually. NHMS annually organizes conferences (technical for internal; and with other organizations) to review and revise the forecasting activities, and NHMS has a SOP for the above-mentioned conferences. CCFSC modifies their SOPs every 3-5 years in light of lessons learned over this period.

6.2.13 SOPs are used as part of work manual. CCFSC organizes annual training for CCFSC and PCFSC staff.

Synergized Process

6.2.14 Disaster management agencies' SOPs are independent and not synergized. There are no MOUs or SOPs for coordinated actions among disaster management agencies in a multi-hazard situation. However, individual SOPs have been compiled together in the form of a book.



Regional and International Frameworks for Disaster Management

6.2.15 The “ASEAN Agreement on Disaster Management and Emergency Response” was concluded in July 2005, ratified by 10 Member Countries (including Viet Nam) 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 for 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.]*

6.2.16 Viet Nam also has coordination/cooperation mechanisms with international and regional organizations, e.g., WMO, IOC, the Mekong River Commission (MRC), the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) and the ESCAP/WMO Typhoon Committee. Specifically, MONRE has a MOU with CMA, NHMS has a MOU with KMA and agreement with JMA, and IGP has an agreement with IOC and RIMES. Within these frameworks, NHMS and IGP perform their duties and responsibilities for disaster mitigation and risk management based on the international/regional standards. For example, in the event of Typhoon Haiyan in November 2013, at the request of NHMS, forecast supporting products and advice on emergency response were provided by WMO and Typhoon Committee Members (including China; Hong Kong, China; Japan; Republic of Korea; and USA), the RSMC Tokyo - Typhoon Center (e.g., for TC track guidance and storm surge forecasts) and other advanced centers (e.g., ECMWF, NCEP and UKMO).

6.2.17 A regional agreement within MRC called “Mekong Agreement and Procedures” was concluded on 5 April 1995 for sustainable development and utilization of the water and related resources and environment of the Mekong River Basin. This regional agreement contains: Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin; Procedures for Data and Information Exchange and Sharing; Procedures for Water Use Monitoring; Procedures for Notification, Prior Consultation and Agreement; Procedures for the Maintenance of Flows on the Mainstream; and Procedures for Water Quality. *[The “Mekong Agreement and Procedures” is also attached to this Report separately.]*

6.3 Recommendations for the SSOP Manual

6.3.1 The meeting with different stakeholders 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. Among others, the importance of SOP examples and case studies in the SSOP Manual was highlighted.

6.3.2 The meeting with different stakeholders also underlined the need for the historical record of past SOP versions and the periodical assessment of SOPs for the necessary revision.

7. Conclusions and recommendations

7.1 Viet Nam has a very strong legal framework, which clearly details out the institutional framework, implementation mechanisms, allocation of financial resources, and roles and responsibilities of major stakeholders in DRR. With the introduction of the new DRR law, the

system is going to be benefitted immensely, and overall DRR system will ultimately emerge stronger.

7.2 The national DRR strategy/framework, “the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020”, provides a clear direction for effective management of water-related disasters, however it lacks multi-hazard approach. It is expected that in light of the new DRR Law, amendments will be incorporated into the existing DRR framework to include earthquake and tsunami hazards as well in coming years.

7.3 In Viet Nam, meteorology and hydrology are dealt with by one department-level government agency - the National Hydro-Meteorological Service (NHMS) under the Ministry of Natural Resources and Environment (MONRE). Thus, a better collaboration and coordination mechanism exists between meteorology and hydrology, compared to other countries that have separate Meteorological Service and Hydrological Service. The National Center for Hydro-Meteorological Forecasting (NCHMF) plays a key role in providing forecasts and warnings for severe weather and floods. However, earthquake and tsunami is dealt with by the Institute of Geophysics (IGP) of the Academy of Science and Technology of Viet Nam. It would be more appropriate if the existing NCHMF would deal with all the key hazards prevailing in Viet Nam by merging the operational unit of IGP into NCHMF so as to create a unified platform for handling multi-hazards and to synergize the existing early warning systems.

7.4 In Viet Nam, a good blend of structural and non-structural flood mitigation measures exists. Non-structural measures include a reasonably good (even though not adequate to meet the data needs to a completely satisfactory level) network of river data monitoring system link through a fail-safe communication system to the Hydrological Forecasting Division of NCHMF and 6 weather radars to monitor the rainfall and the weather systems. A reasonably reliable flood warning system exists based upon the use of hydrological models. Structured measures include the construction of 6 big multi-purpose dams on the Red River, which are being effectively used to reduce the floods. This measure has reduced the flood damage to the city of Hanoi to a good extent.

7.5 A kind of standardized procedure to handle each prevailing hazard at relevant disaster management agency has been developed and is in place at present in Viet Nam. However, these standardized operational procedures define “who” (responsible agency), “what” (roles and responsibilities), “when”, “where” and “why” to do it, but not necessarily define clearly “how” to do it. The SOPs focusing on “how to do it” should be well documented for each hazard and each step within all the components of a people-centered early warning system.

7.6 The “Manual on Synergized Standard Operating Procedures (SSOP)” is still needed and useful for the development of well-documented SOPs for Viet Nam. It is recommended that some products and SOP examples in Viet Nam be incorporated into the SSOP Manual as examples of good practices.

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

4-5 September 2014

No.	Name	Agency/Organization	Position/Designation
1	Ms Do Quynh Hoa	NHMS of Viet Nam	Deputy Chief of Science - Technology and International Cooperation Department
2	Mr Vo Van Hoa	National Center for Hydro-Meteorological Forecasting (NCHMF), NHMS	Deputy Director
3	Mr Tran Quang Nang	National Center for Hydro-Meteorological Forecasting (NCHMF), NHMS	Deputy Chief of Short-range Weather Forecasting Division
4	Mr Dang Ngoc Tinh	National Center for Hydro-Meteorological Forecasting, NHMS	Chief of Northern Hydrological Forecasting Division
5	Mr Pham The Truyen	Institute of Geophysics (IGP), Academy of Science and Technology	
6	Mr Vu Dinh Quang	Ministry of Defense	
7	Ms Pham Thanh Thu	Weather and Disaster Broadcast Centre, Viet Nam Television (VTV-WDB)	Director of VTV-WDB
8	Ms Tran Thao Linh	VTV-WDB	
9	Ms Tran Hoang Kim Anh	VTV-WDB	
10	Ms Hoang Thanh Van	VTV-WDB	
11	Ms Nguyen Anh Thu	VTV-WDB	
12	Ms Bui Hai Binh	VTV-WDB	
13	Ms Bui Thi Thanh Thao	VTV-WDB	
14	Mr Dao Tuan Dung	VTV-WDB	
15	Dr Vu Kien Trung	Standing Office of CCFSC	Deputy Director of CCFSC
16	Mr Nguyen Hiep	Standing Office of CCFSC	Chief
17	Ms Dam Thi Hoa	Standing Office of CCFSC	

Appendix II

QUESTIONNAIRE (SSOP Project) Completed by Viet Nam

I. Background Information

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

*Mr Vo Van Hoa, Deputy Director, National Center for Hydro-meteorological Forecasting (NCHMF)
National Hydro-Meteorological Service (NHMS)
Ministry of Natural Resources and Environment (MONRE)
4 Dang Thai Than, Hanoi, Viet Nam
Phone: +84 4 3933 1681 Fax: +84 4 3824 4921 e-mail: vovanhoa@nchmf.gov.vn*

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

*Ms Do Quynh Hoa, NHMS, and
Mr Tran Quang Nang, NHMS.*

The Questionnaire was complemented by other disaster risk management agencies including the Central Committee for Flood and Storm Control (CCFSC), attended at the working-level meetings with the consultants on 4-5 September 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?

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

The Law No. 33/2013/QH13 on Natural Disaster Prevention and Control was issued on 19 June 2013 and took effect from 1 May 2014.

In the Chapter 5, Item 3 regulating:

Ministry of Natural Resources and Environment is responsible for:

- Issuing and directing legal documents of natural disaster forecasting and warning or submitting to the authorities;*
- Planning and directing the implementation of meteorological, hydrological and oceanographic forecasting;*

- (c) *Implementing observation, collection and processing of information to identify, assess disaster risk, disaster risk zone; monitoring natural disasters; performing forecast and warning and providing timely and accurate information about natural disasters related to meteorological, hydrological, oceanographic to the Central Committee for Flood and Storm Control, and related ministries, ministerial-level agencies, Government agencies, localities, and mass media under regulation;*
 - (d) *Organizing research and application of advanced science and technology; international cooperation in natural disaster forecast and warning; professional training for staff working in forecasting and warning as well as in the field of propagation and dissemination of knowledge, experiences and law related to natural disaster forecast and warning; and*
 - (e) *Examining, inspecting and settling complaints and denunciations and handling violations of the law on the prevention of natural disasters within its jurisdiction.*
- *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?*

The Decision No. 77/2013/QĐ-TTg dated 24 December 2013 on promulgating functions, responsibilities and organization of the National Hydro-Meteorological Service under the Ministry of Natural Resources and Environment of Viet Nam.

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

Decision No. 17/2011/QĐ-TTg dated 14 March 2011 on promulgating the Regulation on delivering/broadcasting the tropical depression, storm and flood forecasts.

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.

Decision No. 17/2011/QĐ-TTg dated 14 March 2011 on promulgating the Regulation on delivering/broadcasting the tropical depression, storm and flood forecasts.

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?

In Viet Nam, the Central Committee for Flood and Storm Control (CCFSC) is the national committee for guiding disaster risk reduction.

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

Members are from many related ministries/agencies/organizations, such as the Government Office, the Ministry of Natural Resources and Environment, the Ministry of Defense, the Ministry of Agriculture & Rural Development, the Ministry of Public Security, the Ministry of Transport, etc.

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

*Yes, we have a mechanism at provincial, district and commune levels.
Members are from related provincial, district and commune departments.*

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)?

CCFSC is responsible for decision making, advisory and coordination of disaster management activities.

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?

*Yes, CCFSC has its own SOPs to handle different coastal hazards
Yes, local committees such as provincial committee have their own SOPs.
(For more details, refer to: <http://www.ccfsc.gov.vn/KW367A21/Trang-chu.aspx>.)*

2c: National Organizations

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

There are the National Hydro-Meteorological Service (NHMS), the Institute of Geophysics (IGP), the Central Committee for Flood and Storm Control (CCFSC) and the Disaster Management Center.

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.

NHMS and IGP are responsible for issuing warnings and CCFSC and the Disaster Management Center are for making disaster management. Example: NHMS makes warning evaluation and CCFSC makes warning dissemination.

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

All of related ministries/agencies/organizations have their own SOPs for their assigned tasks. For example, NHMS has its SOPs for natural hazard forecast, CCFSC has its SOPs for warning dissemination and final decision making, and IGP has SOPs for tsunami and earthquake warning.

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?

NHMS receives international warnings from RSMC Tokyo - Typhoon Center through its Website and fax. The National Center for Hydro-Meteorological Forecasting is responsible for receiving warnings. IGP receives tsunami information from JMA and PTWC, by fax, Website and SMS.

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

All available communication methods are used in receiving warning messages, such as telephone, fax, email, SMS, and these methods are utilized as back up for each other.

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

Yes, NCHMF and IGP are operational 24/7.

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

IGP has an agreement with IOC. NHMS has a MOU with KMA and agreement with JMA, and MONRE has a MOU with CMA.

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?

NHMS and IGP have SOPs to follow after receiving international warnings.

For instance, if a storm formed over East of the Philippines and would enter the East Sea within 24 hours, NHMS will immediately issue storm warnings. After a storm enters the East Sea, NHMS would name it as Number.

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?

Yes, SOPs are always available within NHMS and IGP for the implementation of the backup or alternate method. This kind of backup method will be tested regularly.

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?

NHMS of Viet Nam has 9 Regional Centers, 6 of them have coastal lines. NCHMF is responsible for issuing all warnings for the whole country and the Regional Centers issue the detailed bulletins.

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?

Yes, all the Regional Centers run forecast 24/7, same as NCHMF, in stormy and flood seasons. In other cases, they are on an on-call basis through automated processes.

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.

No, there are no MOUs or SOPs for coordinated actions in a multi-hazard situation. NHMS SOPs are applied to all the Regional Centers.

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?

No. NHMS of Viet Nam has a plan to modernize the observation station network. For example, the coastal weather radar stations will be increased from 6 up to 15 to cover the whole country.

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?

NHMS currently use its own conventional and non-conventional observation networks along with its own communication system (WAN, Internet, Telephone, etc.) for monitoring hazard, collecting data and disseminating warning messages. However, the hazard monitoring network is not dense enough to observe natural hazards in small scales such as thunderstorm, especially when hazards is active in the East Sea.

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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?*

Major obstacles are: budget for operation and maintenance; and human resources (technical operators) - both quality and quantity.

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

All collected data will be shared among agencies in real time via WAN, internet, fax and telephone.

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

Through GTS and the Internet.

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?*

Yes, the IT Center of NHMS has its own SOPs for collecting, processing, sharing observation data with other related units (internal and external).

NHMS can handle outages but not malfunctioning sensors. The maintenance will be handled by manufacturing companies (with contract).

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

Yes, there are SOPs for providing data to the governmental agencies and organizations, but for the private users, permission from NHMS is needed.

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

Yes, NHMS has SOPs on handling international and regional data. For example, NHMS has agreements with JMA, KMA, CMA, etc. to handle global NWP products. After receiving all the necessary data, NHMS follows the SOPs for decoding, processing and displaying products to serve for operational forecasting procedures.

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?*

Yes, Viet Nam has announced the Law of Natural Disaster Prevention and Control, effective on 1 May 2014. In the near future, NHMS will submit the Law of Hydro-Meteorology to Viet Nam Parliament.

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

NHMS and IGP have procedures for issuing warnings. There are standard formats (language) for this purpose

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

Yes, NHMS has a multi-hazard plan to implement “The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020”.

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?

Yes, NHMS has cooperation and agreements with other NMHSs and international agencies to keep the data analyses, prediction and warning generation up to date.

Question 33: Does each warning center have detailed SOPs on each hazard on how to conduct the analysis and prediction and prepare the warnings? Are there separate SOPs for each hazard or is there a multi-hazard approach 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?

Yes, NHMS and IGP have separate SOPs for each natural hazard such as tsunami, typhoons, cold surges, heat waves, etc.

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?

Yes, NHMS and IGP follow WMO and other international standards.

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.

Yes. For example, the document named “Legislation of Prevention and Reduction of Natural Hazard” is available for references.

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?

*NHMS provides two kinds of formats: Text and Map files. (See **Appendix III.1.**)*

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.

CCFSC will assign members of CCFSC, who are also the Heads of Provinces/Communes to ensure the warning alerts are targeted to people in their responsible areas.

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?

Yes, NHMS has SOPs for more detailed steps to state the format, process, etc.

Yes, these SOP describe operational procedures to guide the forecasters to create geographical and text warning messages.

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.

Yes, warnings are consistent over time and include follow-up actions. NHMS follows the Decision No. 77/2013/QĐ-TTg dated 24 December 2013 on promulgating functions, responsibilities and organization of the

National Hydro-Meteorological Service under the Ministry of Natural Resources and Environment (MONRE) of Viet Nam.

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

The warnings use the wording that indicates the time, places and potential risks.

Example: According to a Low prevailing over red river delta area from surface up to 5000m high, there could be heavy rain from 11 of August. The areas will be affected including the whole red river delta areas, Provinces from Thanh Hoa to Ha Tinh. This occurrence could be ranged from 11 to 15 of August. All the mountainous areas should aware flood as well as flash flood. Next warnings will be issued at 0906Z.

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

All the warnings will be sent to the public via all available public broadcasting manners such as the Internet, radio, television, telephone, etc.

Example: VTV uses sign language to communicate with the people who have disabilities.

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?

NHMS has strategies to modernize the observation network and forecasting technology along with developing human resources to meet the needs of the public. NHMS provides training courses and conferences to journalists, TV broadcasters about the accuracy and uncertainty of the warning to enhance the credibility of the warnings.

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?

Annually, NHMS organizes conferences (technical for internal; and with other organizations) to review and revise the forecasting activities

Yes, NHMS has a SOP for the above-mentioned conferences.

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?

All of observation network and forecasting system from national to local levels have their own back up plans. These plans have to be submitted annually to NHMS before natural disaster season. For examples, at each of observing station, NHMS has back-up equipment in place and also has a plan to replace operator if needed.

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

Yes. For example, when typhoon is approaching a coastal area, NHMS will assign an expert from the national forecasting center to the relevant provincial forecasting center.

4c: Assessment Process

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

NHMS cooperates with FMI to help NHMS develop a monitoring system for conventional and non-conventional observation networks in which a quality management system is in place.

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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.*

Yes, the IT Center of NHMS has SOPs to help operators routinely monitor and evaluate all observation data transferred from surface and upper-air stations.

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

NHMS has a verification division that is responsible for verifying all forecasting/warning bulletins issued by National Center, Regional Centers and Provincial Centers. The verification procedure is implemented weekly, monthly and annually.

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

NHMS usually organizes several technical meetings after natural hazard events to review and revise the forecasting procedures. The key purpose of these meeting is to find out the gaps in current operational forecasting procedures, gaps in observation network, challenges in forecasting, etc.

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.*

Yes, NHMS has SOPs on “after action” verifications and assessments.

Section 5: Dissemination/Communication and Response

5a: Organization

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

NHMS, IGP and CCFSC. NHMS and IGP generate forecasts and warning messages and CCFSC disseminate the messages in association with media to all the stakeholders (local authorities and end-users).

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?*

Yes. For example, NHMS follows “the Decision No. 17/2011/QD-TTg dated 14 March 2011 on promulgating the regulation on delivering/broadcasting the tropical depression, storm, flood forecasts”. IGP and CCFSC also follow the above Decision.

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.*

Yes, NHMS has detailed SOPs for warning dissemination. In order to ensure the effective implementation of these SOPs, NHMS has a detailed cooperation agreement with related agencies in disseminating hazard warning. For example, in typhoon forecast, NHMS has a cooperation agreement with CCFSC and VTV which shows out what time warnings have to be disseminated, who will receive the warning first, the communicating way to use, etc.

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?*

CCFSC has the communication strategy to ensure that all warning messages are sent on time to the public and local emergency management committees. VTV uses sign language on TV to ensure that people with hearing disabilities can understand the warnings. The local emergency management committees have their own authorized staff and volunteers who can go directly to meet the people (who can not receive the warning messages) in order to talk to them about the coming hazards.

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?

When a natural hazard is coming or during hazard event, the public media at all levels announces the warning. Information from CCFSC is provided to the media, including TV (VTV and private channels) and radio (Voice of Viet Nam), coastal network of radio transmission and the Viet Nam News Agency (VNA). Especially at local level, messenger runners are used to send warnings to communities who cannot access to the warning via the Internet, radio and television.

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?

The disaster risk management bodies, the warning agencies and media have a coordinated agreement/SOPs in communication during a hazardous event, and the annual budget is provided to these to upgrade and maintain the communications. The coordinated SOPs indicate the responsibilities of each partner in providing/disseminating/receiving/processing hazard warnings.

Media issues more descriptive bulletins with increased frequency.

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?

No, but during hazard event, private sector resources (e.g., amateur radios and safety shelters) have to obey the requests from the Government in providing/disseminating/receiving/processing hazard warnings to the public.

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

Yes, the communication systems are basically based on telephone and the Internet.

WDB starts a hot line for extreme conditions. They invite experts for Q&A sessions on special occasions. WDB is planning to use social media for confirmation of receipt of info.

CCFSC teams, from time to time, go to assess the disaster situation which also get feedback from local people about the functioning of the warning system. CCFSC makes phone calls to the local officials (immediately after the event).

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. Are there MOUs or agreements which document and define these roles?

Yes, their key activities are coordinated with governmental agencies so as to deliver warnings, collect information about loss of life and property damage, help injured people and distribute relief (food, clothes, etc.). Yes, NHMS, IGP and CCFSC have MOUs or agreements with Red Cross/Red Crescent Society.

All non-government, people-centered, community-based organizations are involved informally in capacity building and non-structural activities, including early warning systems. There are no formal MOUs or agreements with such organizations.

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

Yes, NHMS organizes annual training programs for the media on coastal, multi-hazards, mitigation, warning, and preparedness. The key content of this training is to pay attention to basic knowledge about hazards; how to understand the warning; how to respond; how to prevent or prepare, etc. Especially, NHMS also disseminate flyers to the public in order to propagate basic knowledge about hazards.

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?

CCFSC organizes annual practices in which all the governmental agencies/committees of hazard prevention along with the public to test current SOPs and ensure that all steps of SOPs are effectively implemented. In these practices, the synthetic situations are given out and governmental agencies/committees of hazard prevention have to issue final decisions based on their SOPs. Through the annual practices, all the governmental agencies/committees of hazard preventing can find out the gaps in SOPs and revise their SOPs.

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

Yes, CCFSC collects data of loss of life and property; CCFSC at local level and people committees are involved in collecting damage data.

Yes, CCFSC at national and local levels has their coordinated procedures/MOUs.

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?

Yes, the Ministry of Education and Training, the Minister of Information and Communications, the Minister of Health, the Viet Nam News Agency – VNA, the Voice of Viet Nam – VOV, and the Viet Nam Television – VTV are involved.

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?

Yes, main activities are coordinated with governmental agencies to deliver warnings, educate basic knowledge about preparedness, etc.

Yes, NHMS, IGP and CCFSC have MOUs or agreements with Red Cross/Red Crescent Society.

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

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person(s) considered in the SOPs?

No such factors are considered.

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?*

Yes. CCFSC modifies their SOPs based on lessons learned every 3-5 years.

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?*

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?*

Yes (for both questions).

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?*

No.

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?*

No.

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?*

All SOPs always have a historical record after cover and content pages. The historical record includes information on: when is revised, what step is newly added, short description about the revised content, and who revised. CCFSC does not maintain the historical record.

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

Yes.

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?*

SOPs are used as part of work manual. CCFSC organizes annual training for CCFSC and PCFSC staff.

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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?*

Yes. *The Government or Agencies who approved SOPs normally implement the evaluation and review annually.*

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?*

Based on the evaluation results on the effectiveness of SOPs through the decrease in human and property damage.

Yes.

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

NHMS, IGP and CCFSC have testing and monitoring procedures for implementing their SOPs as given in Law No. 33/2013/QH13.

Appendix III.1

Sample of Typhoon Warning

(An example for TC track and intensity forecasting map issued by NCHMF)

No: BGBI4-17IDBKT

Hanoi, Day 09 Month 11 Year 2011

TYPHOON WARNING

(No. 14 - Haiyan)

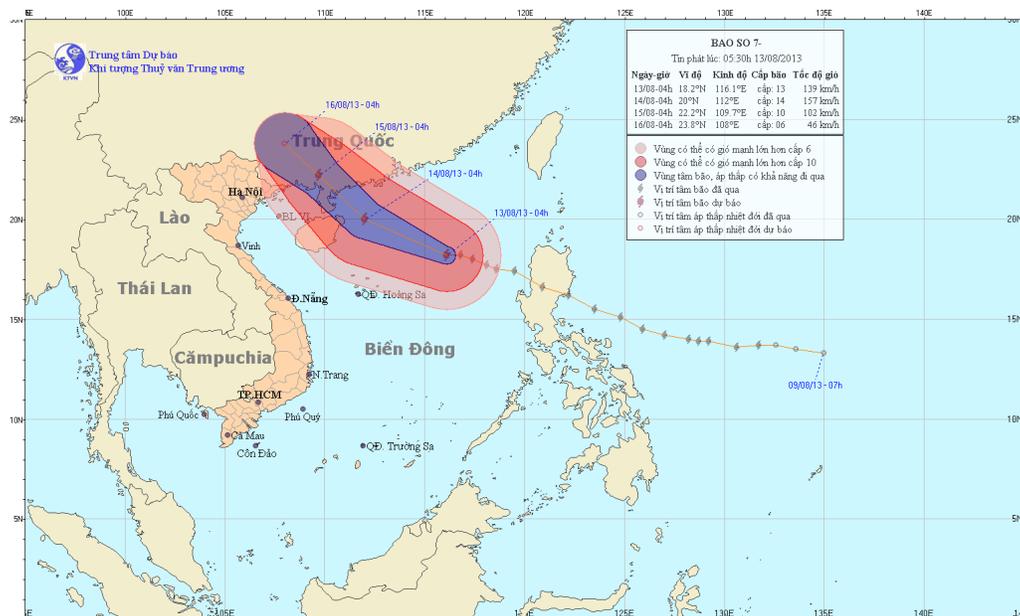
At 090600Z, Typhoon Haiyan located near 13.5N - 114.8E, approximately 240km North of Song Tu Tay Island (Sparatly Islands). Maximum sustained wind speed near the center is estimated to be 14 - 15 Beaufort (150 to 183 km/h), gust 16 - 17 (184 to 220 km/h).

Forecast to move West - Northwest at about 30 km per hour for the next 24 hours. At 100600Z, the position located near 16.7N - 108.3E. Maximum sustained wind speed near the center is estimated to be 13 - 14 Beaufort (134 to 166 km/h), gust 15 - 16 (167 to 201 km/h).

Forecast to move Northwest at about 20 - 25 km per hour for the next 24 - 48 hours and downgrade into a Tropical depression. At 110600Z, the position is located near 20.8N - 103.8E, over the boundary of Vietnam- Lao. Maximum sustained wind speed near the center is estimated to be 6 - 7 Beaufort (39 to 61 km/h), gust 8 (62 - 74 km/h).

Forecast to move North at about 15km per hour and downgrade into a Low for the next 48 -72 hours.

Next warnings will be issued at 091030Z.



Appendix III.2

Sample of Flood Forecast

FLOOD INFORMATION ON THE TAO, CAU, THUONG, LUC NAM RIVERS

I. Remark

In the past 36 hours, moderate to heavy rain occurred in the North of Viet Nam due to the affects of storm No. 5. The mean precipitation were recorded between 70 to 150 mm in which high amount of rainfall at Thanh Son (Phu Tho): 217mm; Tam Dao (Vinh Phuc): 274mm; Son Duong (Tuyen Quang): 208mm; Van Chan (Yen Bai): 186mm; Viet Yen (Bac Giang) 167mm; Pho Du (Thai Nguyen): 170mm; Cha (Bac Can): 176mm; Luc Nam (Bac Giang): 161mm.

Water levels on the Thao, Cau, Thuong and Luc Nam is sharp rising, Water levels at main stations at 19PM 18/8 is detailed as below:

- On the Thao river at Yen Bai: 30.52m, above Alarm level (AL) 1: 0.52m; at Phu Tho: 16.9m, below AL 1: 0.6m
- On the Cau river at Dap Cau: 4.08m, below AL 1: 0.22m
- On the Thuong river at Phu Lang Thuong: 3.9m, below AL 1: 0.4m
- On the Luc Nam tai Luc Nam: 4.85m, below 2: 0.45m

II. Forecast

Water level on the Thao river will continue rising. Tomorrow (19/8), WL on the Thao at Yen Bai will be able to reach 31.3m at 7AM (over AL 2: 0.3m), and 31.7m at 19PM (below AL 2: 0.3m); at Phu Tho will be able to reach 18.0m at 19PM (below AL 3: 0.3m).

During tonight and early morning of tomorrow, WL on the Cau, Thuong, Luc Nam river will be able to reach a peak. Peaks of flood on the Cau at Dap Cau will reach 4.6m (over AL1: 0.3m); on Thuong river at Phu Lang Thuong: 4.3m (AL 1); on the Luc Nam river at Luc Nam: 5.0m (below AL2: 0.3m).

Flash flood, landslide will be able to occur on streams, small rivers in mountainous areas of provinces as Cao Bang, Bac Giang, Bac Can, Thai Nguyen, Tuyen Quang, Ha Giang, Lao Cai, Yen Bai, Phu Tho ...

Flood situation will be complicated, please following next flood information at 10AM on 19/8.

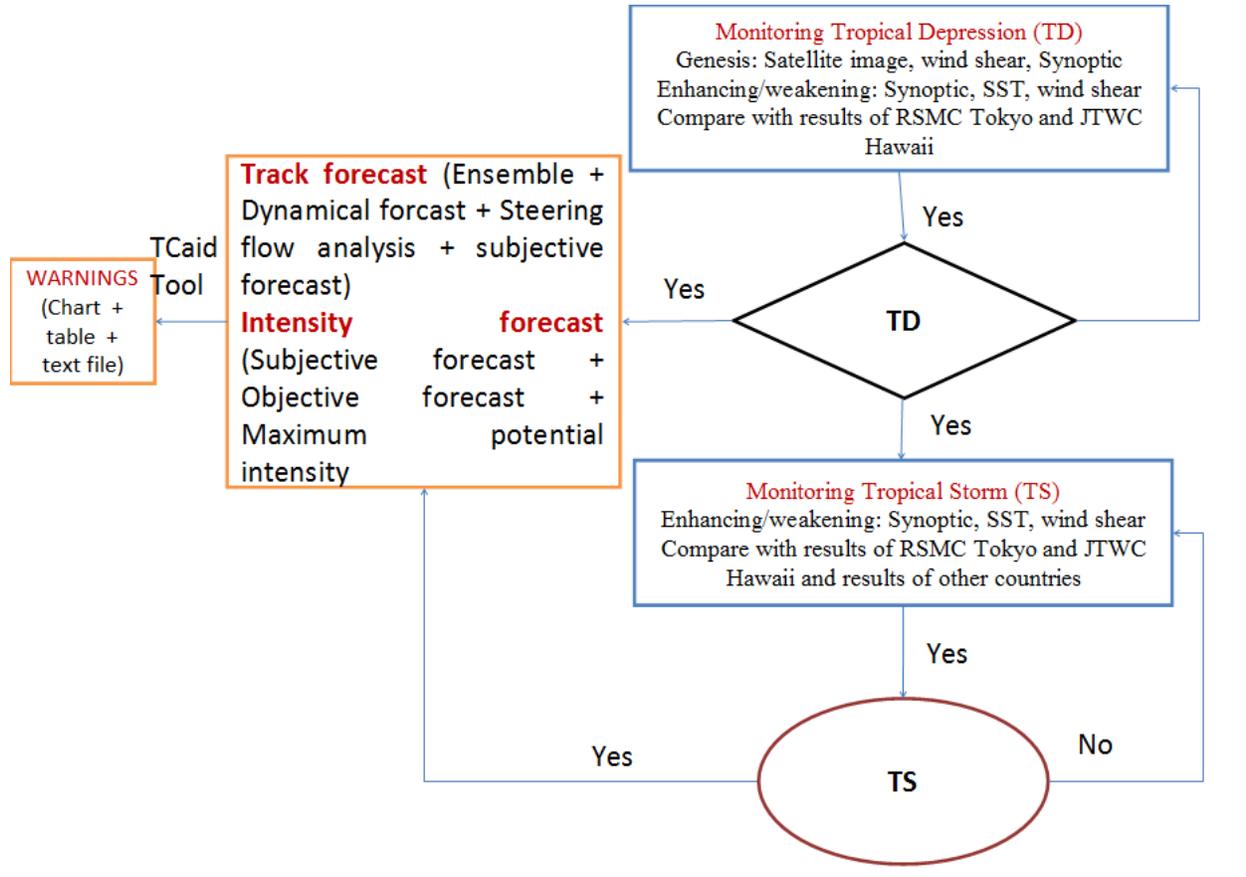
Appendix IV.1

Example of SOP (1) Standard Operational Procedure for Tropical Storms

SIGNAL #1	Tropical storms activate east of 120°E, expected to enter the East Sea within the next 24 hours
SIGNAL #2	Tropical storms activate over the East Sea; and <ul style="list-style-type: none"> - The distance to the nearest point of the Land is < 1000 km; or - The distance to the nearest point of the Land is between 500 ~ 1000 km and is not expected to make landfall within 48 hours
SIGNAL #3	<ul style="list-style-type: none"> - The distance to the nearest point of the Land is between 500 ~ 1000 km and is expected to make landfall within 48 hours; or - The distance to the nearest point of the Land is between 300 ~ 500 km and is not expected to make landfall within 48 hours
SIGNAL #4 (Urgent)	<ul style="list-style-type: none"> - The distance to the nearest point of the Land is between 300 ~ 500 km and is expected to make landfall within 48 hours; or - The distance to the nearest point of the Land is < 300km
SIGNAL #5 (Urgent)	<ul style="list-style-type: none"> - Tropical storms make landfall; or - Tropical storms make landfall to another countries but wind over 39 km/h is expected to impact Viet Nam within 48 hours
SIGNAL #6 (Final)	<ul style="list-style-type: none"> - Tropical storms have dissipate; or - Tropical storms have moved out of the East Sea; or - Tropical storms have no possibility of affecting Viet Nam

Appendix IV.2

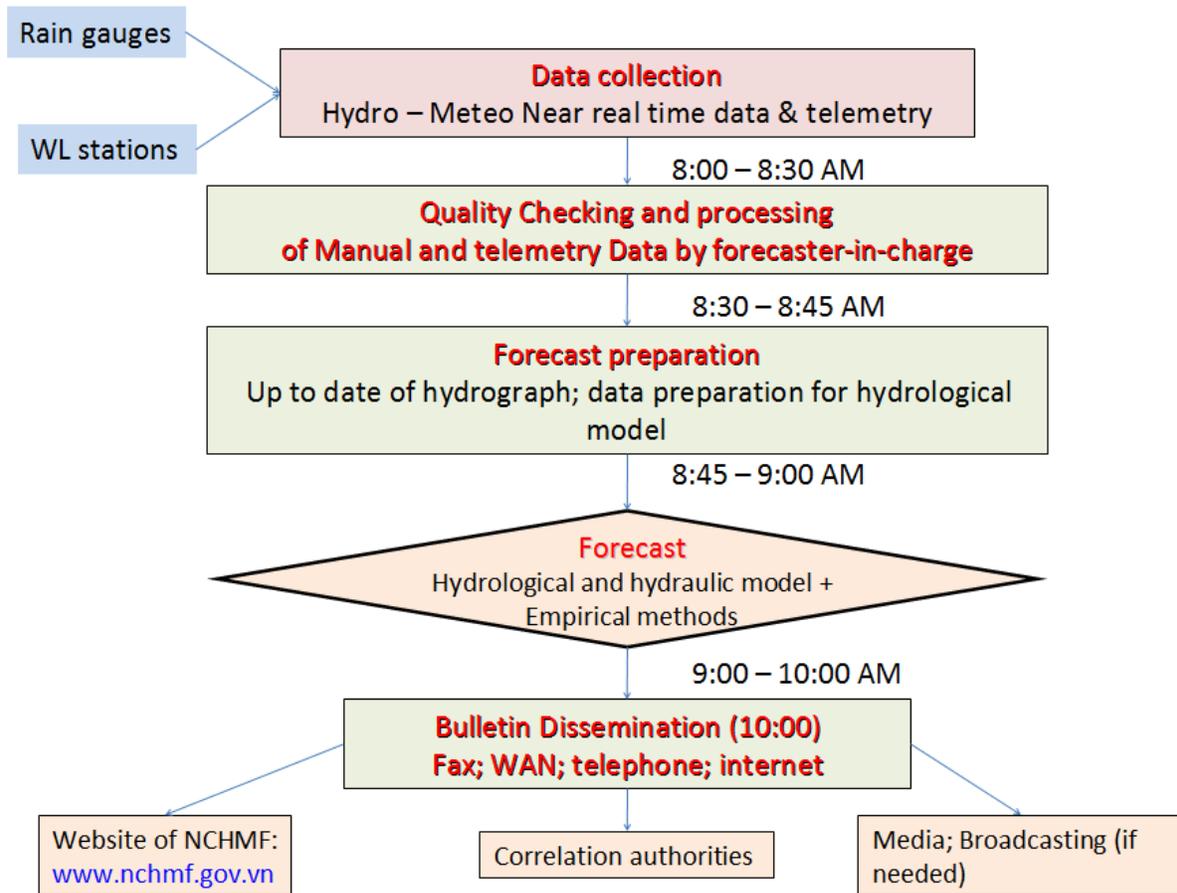
Example of SOP (2)



Short-range forecasting procedure for tropical cyclone (applied to forecasters at national level)

Appendix IV.3

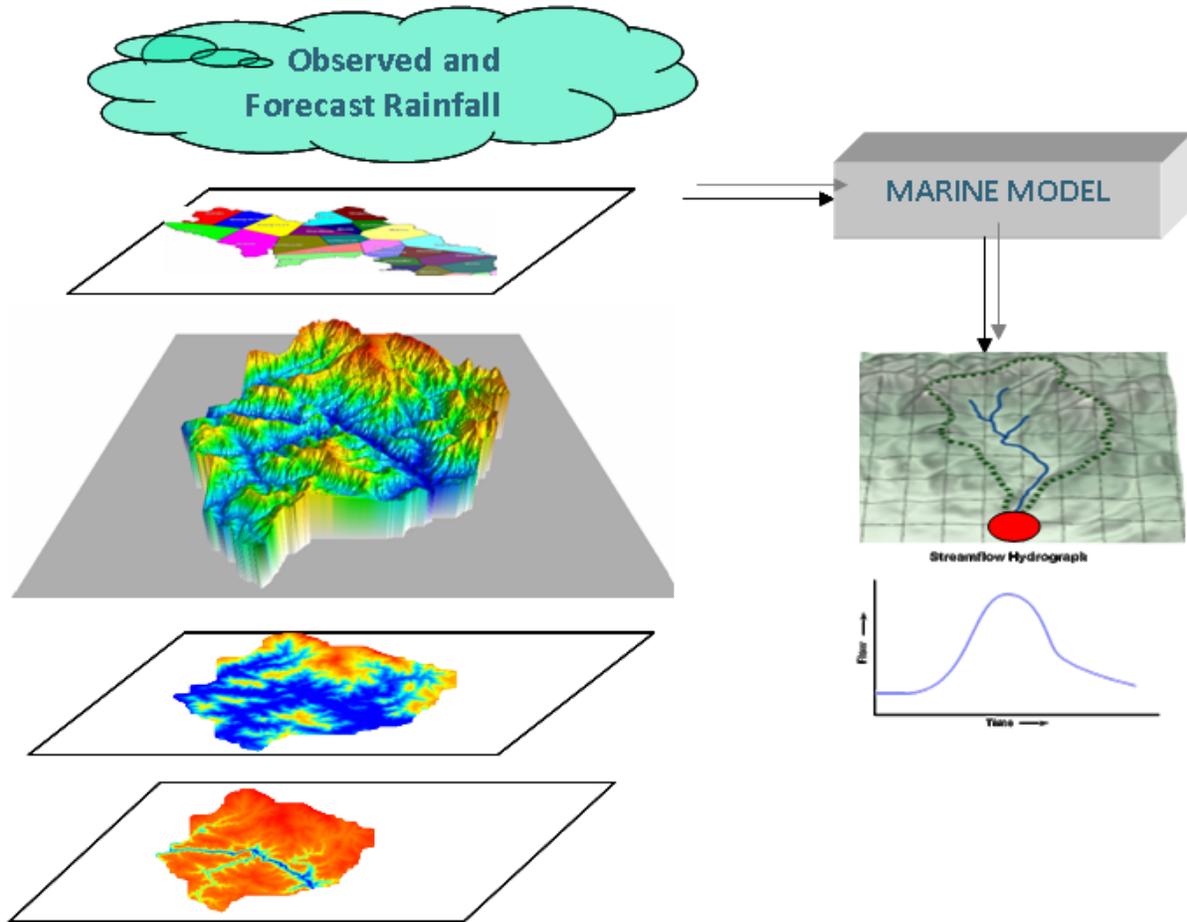
Example of SOP (3)



**Common hydrological forecasting procedure
(applied as guidance for forecasters at national and local levels)**

Appendix IV.4

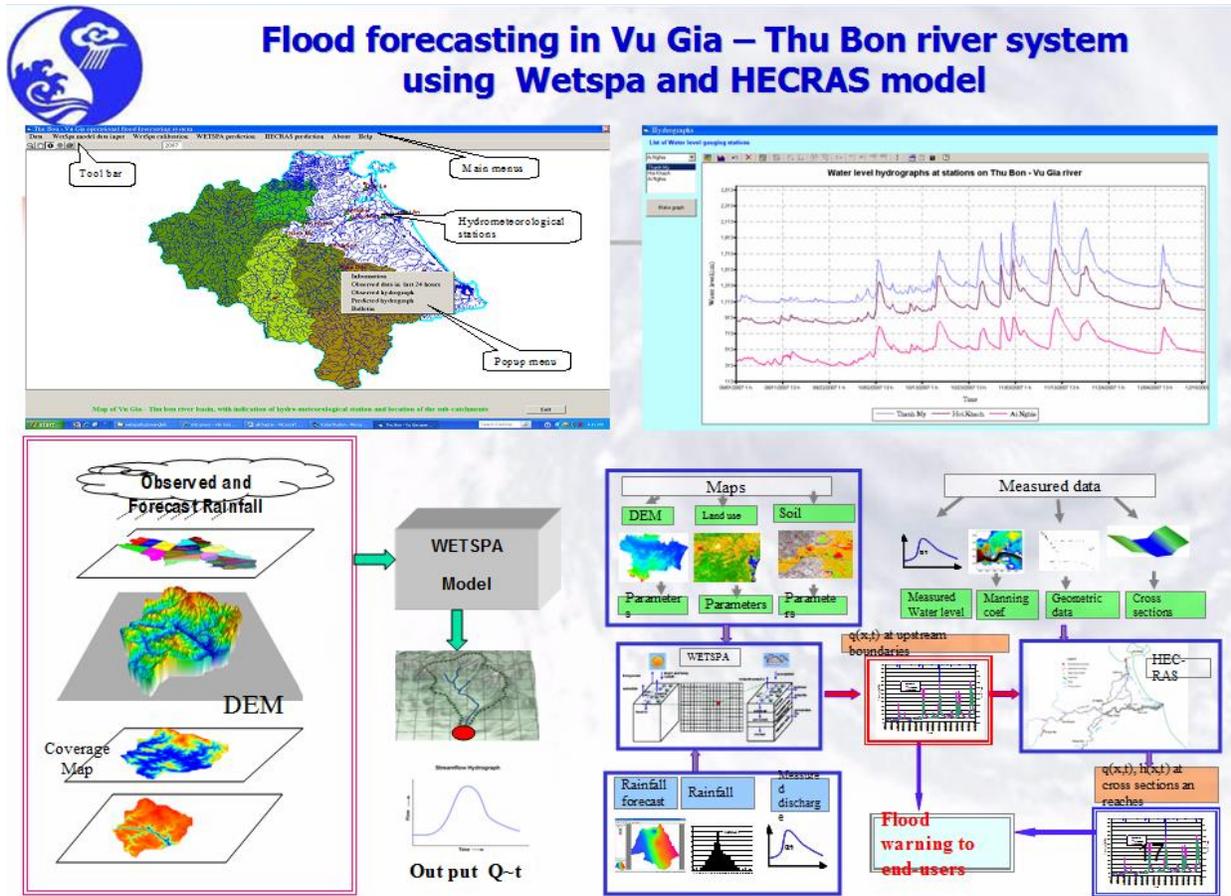
Example of SOP (4)



Short-range forecasting procedure based on distributed hydrologic model MARINE (France) using DEM and GIS in order to calculate inflow to Hoa Binh reservoir from precipitation at Da and Ma river basins

Appendix IV.6

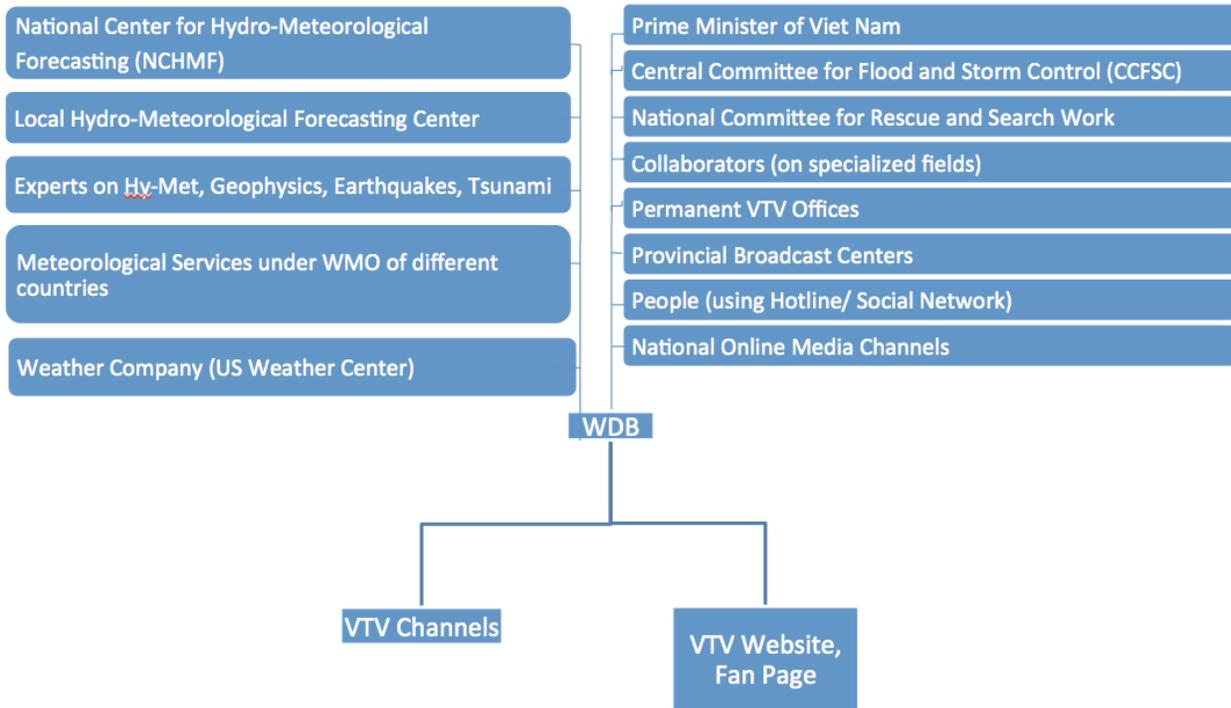
Example of SOP(6)



Flood forecasting procedure for Vu Gia – Thu Bon river basin system based on Wetspa and HECRAS models

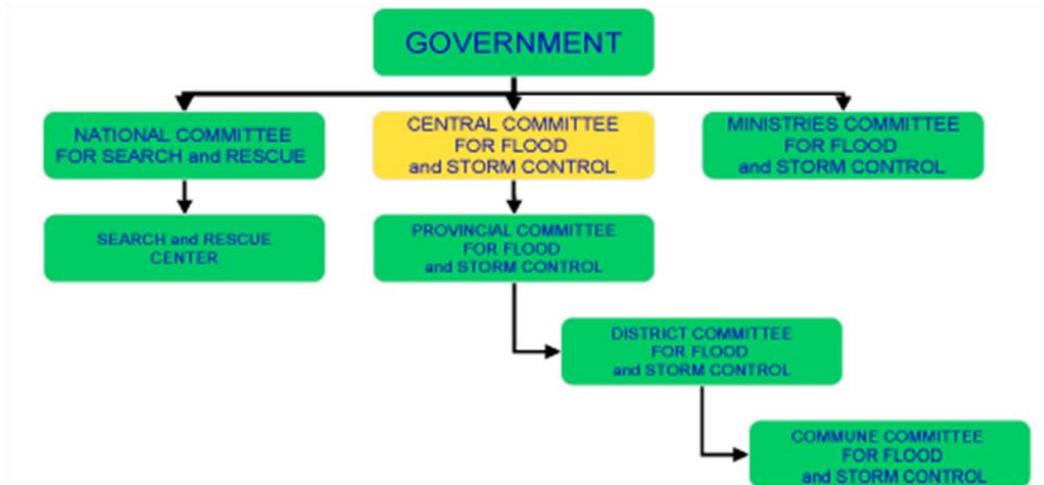
Appendix IV.7

Example of SOP (7) VTV-WDB Standard Operating Procedure - Diagram

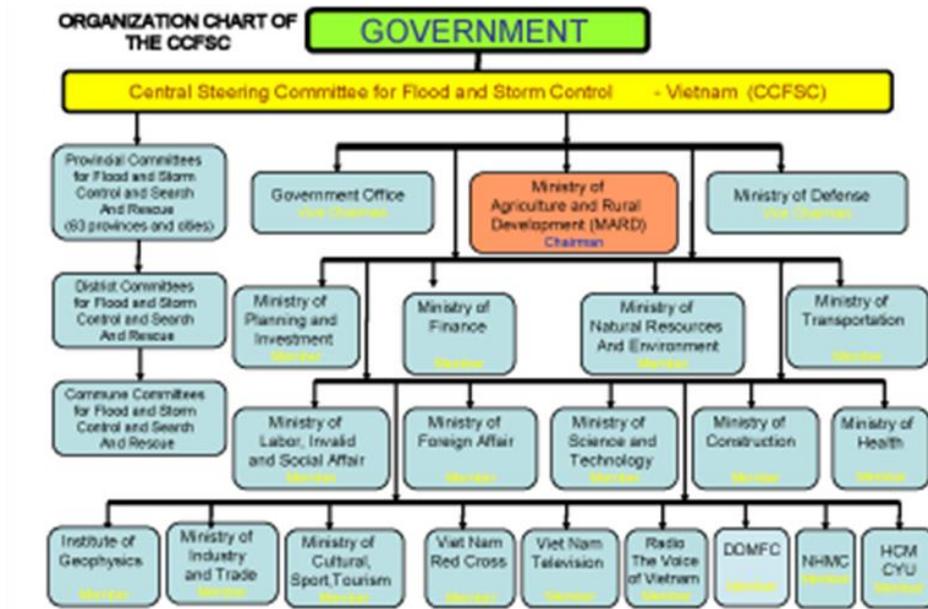


Appendix V

Pictures, Diagrams, flowcharts and ideas collected



Disaster Management Structure in Viet Nam



Organization Chart of CCFSC

**Summary Report on Damage caused by Disaster in Viet Nam in 2008
(Until 3 December 2008)**

Category	Item Damaged	Unit	Whirlwind	Tropical cyclones	Flood	Total
People	Killed	No	52	61	355	468
	Injured	No	92	137	175	716
	Missing	No	0	25	39	128
Housing	Houses collapsed, drifted	No	414	1,832	2,934	9,946
	Houses submerged and damaged	No	9,884	36,765	291,710	666,834
School	School collapsed	Room	5	24	109	271
	School submerged and damaged	Room	225	642	779	3,067
Hospital, Clinics	Clinics collapsed	No	0	0	6	12
	Clinics submerged and damaged	No	1	83	67	301
Agriculture	Rice fields submerged	Ha	6,391	20,543	122,371	292,219
	Farms submerged, damaged	Ha	2,492	16,480	302,508	640,467
	Food damaged by water	Ton	73	10,089	63,231	146,713
Water Resources	Land washed away	m ³	18,637	396,124	2,333,428	5,477,741
	Stone drifted	m ³	0	0	77,709	155,418
	Dykes slumped	m	2,199	71,458	553,779	1,252,673
	Small hydraulic structures collapsed	Unit	38	81	295	790
	Small hydraulic structures damaged	Unit	24	105	1,309	2,852
	Transportation	Land drifted	m ³	320,460	1,327,725	3,080,644
	Rock drifted	m ³	0	700	9,163	19,726
	Bridge, sewer collapsed	Unit	4	277	66	690
	Bridge, sewer damaged	Unit	28	512	721	2,494
	Roads damaged	Km	33	5	647	1,338
	Aquatic product	Shrimp, fish poll broken	Ha	78	2,167	54,955
	Ships sunk, lost	Unit	24	84	142	476
	Ships sunk, damaged	Unit	6	21	31	110
Communication	Telephone poles collapsed	Unit	482	1,123	32	2,792
	Telephone wire broken	m	2,000	52,230	0	106,460
Energy	High voltage electric towers broken	Unit	22	81	62	308
	Electric distribution poles broken	Unit	485	894	631	3,535
	Electric wire broken	m	3,000	87,140	37,020	251,320
	Total damage	USD	11 709 488	102 108 424	687 482 521	801 313 462

Appendix VI

List of Abbreviations

ABBREVIATIONS

ASEAN	Association of South-East Asian Nations
CCFSC	Central Committee for Flood and Storm Control
CMC	Canadian Meteorological Centre
CSCNDPC	Central Steering Committee for Natural Disaster Prevention and Control
DARD	(Provincial) Department of Agriculture and Rural Development
DDMFC	Department of Dike Management and Flood Control
DMU	Disaster Management Unit
DRR	Disaster Risk Reduction
DWD	Deutscher Wetterdienst (German Meteorological Service)
ECMWF	European Centre for Medium-Range Weather Forecasts
ESCAP	Economic and Social Commission for Asia and the Pacific (UN)
EWS	Early Warning System
FY	Feng-Yun Satellite (China)
GIS	Geographic Information System
GTS	Global Telecommunication System (WMO)
HFA	Hyogo Framework for Action
HRM	High-resolution Regional Model (of DWD)
IGP	Institute of Geophysics
IOC	UNESCO's Intergovernmental Oceanographic Commission
JMA	Japan Meteorological Agency
MARD	Ministry of Agriculture and Rural Development
MIKE 11	Danish Hydraulic Institute rainfall-runoff model
MONRE	Ministry of Natural Resources and Environment
MOU	Memorandum of Understanding
MRC	Mekong River Commission
MTSAT	Multifunctional Transport Satellite (Japan)
NAM	Nedbør-Afstrømnings-Model (Danish model for precipitation-runoff)
NCEP	National Center for Environmental Prediction (US)
NCHMF	National Center for Hydro-Meteorological Forecasting
NCSR	National Committee for Search and Rescue
NDMO	National Disaster Management Office
NHMS	National Hydro-Meteorological Service (Viet Nam)
NMHS	National Meteorological and Hydrological Service
NOAA	National Oceanic and Atmospheric Administration (USA)
NWP	Numerical Weather Prediction
PC	People's Council/Committee
PTC	(WMO/ESCAP) Panel on Tropical Cyclones
PTWC	Pacific Tsunami Warning Center
Q&A	Question and Answer
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
RSMC	Regional Specialized Meteorological Centre (WMO)
SMS	Short Message Service
SOP	Standard Operating Procedure
SSOP	Synergized Standard Operating Procedures
TC	(ESCAP/WMO) Typhoon Committee
TCS	Typhoon Committee Secretariat
UKMO	UK Met Office
UNDP	United Nations Development Programme
VSAT	Very Small Aperture Terminal

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VNA	Viet Nam News Agency
VOV	Voice of Viet Nam (Radio)
VTV	Viet Nam Television
WAN	Wide Area Network
WDB	Weather and Disaster Broadcast (Centre)
WMO	World Meteorological Organization
WRF	Weather Research and Forecasting (model)
