

# Report on UN ESCAP / WMO Typhoon Committee Members Disaster Management System



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the Pacific



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**Report on UN ESCAP/WMO Typhoon Committee Members  
Disaster Management System**

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# Foreword

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All over the world, in recent decades, have been suffering from natural disasters such as tropical cyclone, typhoon, hurricane that killed thousands of people and people throughout the world have become increasingly alarmed over extreme weather events owing to climate changes, which seem to be growing in frequency and adverse impact.

Disaster policy response to climate change is dependent on a number of factors, such as readiness to accept the reality of climate change, institutions and capacity, as well as willingness to embed climate change risk assessment and management in development strategies. A focus that neglects to enhance capacity-building and resilience as a prerequisite for managing climate change risks will, in all likelihood, do little to reduce vulnerability to those risks. Reducing vulnerability is a key aspect of reducing climate change risk. To do so requires a new approach to climate change risk and a change in institutional structures and relationships

Development of disaster management system coping with climate change is of particular importance to the United Nations, ESCAP/WMO Typhoon Committee (TC), which has been making a project on flood management system and technology to mitigate the damage from typhoons in countries of Asia-Pacific region. And World Meteorological Organization (WMO) has launched the Natural Disaster Prevention and Mitigation Programme (DPM) to enhance its contribution to natural disaster risk

reduction. This programme provides an integrated and coordinated framework by which governmental authorities and the natural disaster risk management community in both the public and private sectors have access to critical scientific and technical information, promptly and effectively.

Disaster management system in Typhoon Committee Disaster Information System (TCDIS) against typhoons will be upgrade for disaster management system coping to rapidly changing of climate of the earth and the social framework. This publication describes the disaster management system of TC Member and the guideline and base framework for the DMS will be a base to upgrade disaster management to reduce the typhoon related damages and disaster preparedness. And it can be used to develop a more comprehensive and effective approach towards typhoon disaster management of TC Members. Under this new initiative, TC will systematize the TCDIS to share disaster management system of TC Members, typhoon-related information for mitigating damages from typhoons in Asia-Pacific region.



Fong Soi Kun  
Chairman, Typhoon Committee

# Introduction

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Typhoons are well known as no geographical boundaries and bring havoc to very large areas. Effective response to typhoon including tropical cyclones calls for regional cooperation among the affected countries. A key element in such a response is an efficient typhoon warning system which involves the rapid and frequent exchange of information between countries and areas based on extensive observations and close monitoring of the typhoon's development and movement. Obviously such activities cannot be effectively performed on an ad hoc or informal basis, a regional collaboration mechanism is necessary. The Typhoon Committee (TC) was organized under the joint auspices of the Economic and Social Commission for Asia and the Pacific (ESCAP) and the World Meteorological Organization (WMO) in 1968 to promote and coordinate the planning and implementation of measures required for minimizing the loss of life and damage caused by typhoons in Asia and the Pacific area which date and contents of the TC meeting were described.

The TC has established the Working Group on Disaster Prevention and Preparedness (WGDPP) at the 38th Session held on November 2005, in Hanoi, Viet Nam. Dr. Sam-Kew Roh, Republic of Korea and Dr. Ming-Chung Wong, Hong Kong, China were appointed as first Chair and Vice-Chair of WGDPP respectively by members of WGDPP and now chairman were changed by Dr. Waon-Ho Yi, Republic of Korea. The WGDPP developed a WEB-GIS Based Typhoon Committee Disaster Information System (TCDIS) to shear disaster related information and reduce damages from typhoon related disasters of 14 TC Members in Asia and Pacific area namely Cambodia; China; Hong Kong, China; Japan; Lao People's Democratic Republic; Macao, China; Malaysia; People's Democratic Republic of Korea;

Philippine; Republic of Korea; Thailand; USA; Viet Nam.

The Disaster Management Systems (DMSs) of 12 TC Members were collected and analyzed to make the guidelines to consider all elements of effective disaster management system such as the assessment of risk, the technical disaster management, the communication needs, and the preparedness of those at risk. Those elements not directly dealt with by the project were expected to be in place through existing means, so that the project would result in a well integrated system and not be an unconnected link in the chain. The information was also expected to have high impact in terms of people affected, to be technically well-designed, and to be sustainable.

The information was subjected to a quality control process managed by the WEB-GIS based TCDIS platform for the promotion of DMS. The first step was an editing process to ensure that information met the basic requirements of relevance and completeness. Altogether 12 information for each system was entered into the WEB-GIS based TCDIS. The second step involved the review and assessment of the information against the guidelines developed by expert reviewers. Also, needs and gaps of participating members in relation to the implementation of the DMS were identified by analysis information collected from each TC Members. The summary of 12 DMS all information collected from 12 TC Members are uploaded in the WEB-GIS based TCDIS to shear information and reduce the gap of participating members.

The objectives of the report are following as: (i) to collect and report of disaster management systems (DMSs) of 12 TC Members; (ii) analysis the disaster management systems of each TC Members to make

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guideline and support disaster management related information to reduce the typhoon related disasters; (iii) to analyze and assess the recent major damages from typhoon related disasters which information were collected from each TC Members and were described in the disaster management system. The disaster management system are collected from 12 TC Members and reported. The suggestions for the disaster managements were also reported to define

the needs and gaps of participating members by developed guideline. The GIS and damages information database for the disaster management systems are implemented in the TCDIS to find similar typhoon trajectory and to estimate typhoon related damage and shear the disaster management system to reduce damages and for the disaster prevention and preparedness.



Table 1 Summary of disaster management system of 12 TC Members and remarks

	Cambodia	China	Democratic Peoples Republic of Korea	Hong Kong, China	Japan	Lao People's Democratic Republic	Macau, China	Malaysia	Philippines	Republic of Korea	Singapore city-state	Thailand	USA	Viet Nam	
Geography	Area: 181,040 sq. km. (69,900 sq. mi.); Terrain: Central plain drained by the Tonle Sap (Great Lake) and Mekong and Bassac Rivers. Forests away from the rivers and the lake, mountains in the southwest (Cardamom Mountains) and north (Dangrek Mountains) along the border with Thailand. Climate: Tropical monsoon with rainy season June-Oct. and dry season Nov.-May.	Area: 9,596,960 sq. km. (about 3.7 million sq. mi.). Terrain: Plains, deltas, and hills in east; mountains, high plateaus, deserts in west. Climate: Tropical in south to subarctic in north.	Area: 120,540 sq km; Terrain: mostly hills and mountains separated by deep, narrow valleys; coastal plains wide in west, discontinuous in east. Climate: temperate with rainfall concentrated in summer	Area: 1,104.3 sq. km.; Terrain: Hilly to mountainous, with steep slopes and natural harbor. Climate: Tropical monsoon. Cool and humid in winter, hot and rainy from spring through summer, warm and sunny in fall.	Area: 377, 835 sq. km. (145,902 sq. mi.). Terrain: Rugged, mountainous islands. Climate: Varies from subtropical to temperate.	Centre of southeast Asia bordering China (416 km to the North), Myanmar (230 km to the North West), Thailand (1.7 km to the West), Cambodia (492 km to the South) and Vietnam (1.9 km to the East).		Area: 25.4 sq km, located in Eastern Asia, bordering the South China Sea and China; Terrain: generally flat; Climate: subtropical; marine with cool winters, warm summers	Area: 329,748 sq. km. (127,315 sq. mi.); Terrain: Coastal plains and interior, jungle-covered mountains. The South China Sea separates peninsular Malaysia from East Malaysia on Borneo. Climate: Tropical.	The Philippine Archipelago occupies the western rim of the Pacific Ocean (Western Segment of the Pacific Ring of Fire), a most active part of the earth that is characterized by an ocean-encircling belt of active volcanoes and earthquake generators (faults).	Located in the Far East facing the Chinese continent on its west and the Japanese archipelago on its east. About 70% of the total land area (220,848 km2) is mountainous area. Temperate climate with four distinct seasons characterized by many dry days in spring, substantial rain in summer and much snow in winter. Typhoons occur mostly from July to September with two or three affecting Korea directly or indirectly.	Area: 707 sq km. Cities: Capital–Singapore (country is a city-state). Terrain: Lowland. Climate: Tropical.	Area: 513,119 sq. km. Bordered to the north by Laos and Burma, to the east by Laos and Cambodia, to the south by the Gulf of Thailand and Malaysia, and to the west by the Andaman Sea and Burma. By the maritime boundary, the country is bordered to the southeast by Vietnam in the Gulf of Thailand, to the southwest by Indonesia and India in the Andaman Sea.	United States-affiliated islands in the western North Pacific consisting of the Territory of Guam (Area: 549 sq km. Terrain: volcanic origin, surrounded by coral reefs; relatively flat coralline limestone plateau, with steep coastal cliffs and narrow coastal plains in north, low hills in center, mountains in south). Commonwealth of the Northern Mariana Islands (Area: 477 sq km; Terrain: southern islands are limestone with level terraces and fringing coral reefs; northern islands are volcanic, the Republic of Palau (Area: 498 sq. km. In eight main islands plus more than 250 islets. Terrain: Varies from mountainous main island to smaller, reef-rimmed coral islands.), the Federated States of Micronesia (Area: 702 sq. km, Terrain: 607 mountainous islands and low-lying coral atolls.) and the Republic of the Marshall Islands (Area: 181 sq. km. of land area scattered over 750,000 sq. mi. of the Western Pacific. Terrain: 29 low-lying coral atolls and five single islands.)	located in the monsoon tropical region, with total mainland area of 329,241 square kilometer and a coastal line of 3,260 kilometer in length. On average, there is one kilometer of coastal line on every 100 square kilometer.
Hazards /Threats	NA	floods, droughts, earthquakes, forest fires, snow, typhoons, and marine disasters. Flooding is the most serious.		Heavy rain, storm surges, thunderstorms and tropical cyclones	Did not list specifics but can assume earthquakes, tropical cyclones, floods, landslides	Flood, drought, landslides, unexploded ordinance, fires		Typhoons, heavy rain, earthquakes, tsunami	Tropical cyclones, landslides, earthquakes, volcanic eruptions, floods, heavy rainfall	Floods, torrential rain, typhoons, earthquakes, and man-made disasters	While it is spared from natural disasters such as tsunamis, earthquakes, and volcanic eruptions, it is not entirely safe from man-made disasters. Recent disasters included Pulau Merlimau Fire, Nicoll cave-in and a 6-storey Hotel New World collapse.	North is mountainous area which is prone to flash flood, landslide/ mudslide and earthquake. The Northeast is arid area and always faces on severe drought and flood. The Central region is the Basin of Chao Phraya River and become flood during the rainy season. The South is hilly to mountainous with several offshore islands and encounters flood, tropical storm, landslide and forest fires.	Tropical cyclones, drought, landslides, storm surges, coastal inundation	tropical cyclones, floods, storms, drought, salt-water intrusion, whirlwinds and hail, storm surge, landslides, forest fires	
Plan name				Contingency Plan for Natural Disasters		National Action Plan on DM from 2001 to 2010									
Legal Framework of DMS		Law on Water and Soil Conservation, Law on Earthquake Prevention and Disaster Reduction, Law on Fire-Fighting, Meteorological Law, Law on Production Safety, Regulation on forest Fire-Fighting, Regulation on Preventing Forest Pests, and Regulation on Safety Management of Dangerous Chemicals			Disaster Countermeasure Basic Act 1961	Landmark decree No. 158 (Aug 1999) est NDMC	Decree-Law no. 72/92/M, 28 Sept 1992, Law No. 9/2002 (Internal Security Legal Framework) for ensuring social order and stability; Executive Order No. 16/2000, some basic concepts relating to typhoons; Dispatch no. 87/2000, some measure applicable to the education institutes during typhoon signal or rainstorm; Executive Dispatch No. 166/2002, directives for all public depts to follow when typhoon signal #8 or above.	Directive No. 20 of NSC	NDCC legal authority is Presidential Decree (PD) 1566 on 6/11/1978; Office of Civil Defense created by Letter of Instruction 19 (1972)	Natural Disaster Countermeasures Act, (1956) prescribes control of and countermeasures against natural disasters such as torrential rain and typhoons, investigations of relevant damage, rehabilitation, costs, etc. Act on Countermeasures against Agricultural and Fishery Disaster (1955) stipulates measures concerning prevention of and countermeasures against disasters affecting agriculture and fishery. Disaster Relief Act (1962) provides for relieve of victims of natural disasters or calamities, etc. Disaster and Safety Management Basic Law (2004) designate disaster management competent organizations based on the disaster definition.		Disaster Prevention and Mitigation Act 2007 - main law to manage disasters, including air threat and sabotage.	Stafford Act and Disaster Mitigation Act of 2000	Decree No. 168-HDBT (1990) stipulates functions and duties of the Central Committee for Flood and Storm Control at all levels and sectors.	
Policy Levels															
1-National		China National Committee for Disaster Reduction (NCDRI).		Security Bureau	Cabinet Office - Minister of State for Disaster Management = integrate and coordinate disaster reduction policies and measures of ministries and agencies.	Within the Ministry of Labour and Social Welfare, the National Disaster Mgmt Office has responsibility for the formulation of the govt policy on DM	Chief Executive of MSAR	National Security Council is tasked to coordinate efforts among the various agencies involved in disaster management.	National Disaster Coordinating Council (NDCC)	18 Ministries, 4 Central Offices, and 18 Agencies and each body has different roles in disaster management. The National Emergency Management Agency (NEMA) has an overall coordinating function in the national level.	Ministry of Home Affairs	National Disaster Prevention and Mitigation Committee (NDPMC) is the main policy making body	Homeland Security (Guam) or National Emergency Management Offices	CCFSC and the Committees for Flood and Storm Control (CFSC) of all levels and sectors.	
2-Regional				Emergency Monitoring and Support Centre	Central Disaster Management Council = based on Disaster Countermeasures Basic Act and promotes comprehensive disaster countermeasures including deliberating important issues on disaster reduction.	Natl Disaster Mgmt Committee-promotes disaster reduction ACTIVITIES OF EXISTING INE Ministries and Provinces on natural DM and protection	Security Forces Coordination Office (GCSeg.), which is subordinate to the Secretary for Security with the authorities empowered by the Chief Executive of MSAR, is a special office mainly taking responsibility of the civil protection affairs, particularly in combating against natural disasters as well as man-made disasters or incidences.	A Disaster Control and Operation Centre will also be operated. The operation of the Disaster Control and Operation Centre will be established based on the disasters which could either be at the District, State or National level.	OOD as operating arm and the secretariat of the NDCC	Several divisions fall under NEMA with specific functions	Singapore Civil Defense Force	DDPM Director General as Central Director will control and supervise the operation of the Provincial Director or other directors in local administrations and civil defence volunteer all over the country.	State Emergency Management Offices (FSM)	The CCFSC has component such as (i) chairman as the minister of Ministry of Agriculture and Rural Development (IMARD), (ii) Standing Deputy Chairman by the Deputy Minister of IMARD, (iii) Deputy Chairmen by Deputy Director of Government's Office and Deputy Chief of the General Staff of Vietnamese People's Army, and (iv) Members of CCFSC by the Deputy Ministers of Ministries and Sectors	
3-Local				Numerous government agencies	3 plans: Basic Disaster Management Plan (CDMC), Disaster Management Operation Plan (govt orgs and designated public corporations, and Local Disaster Management Plan (prefectural and municipal disaster mgmt council)						Civil Defense Divisions	In the provincial level, the Governor as the Provincial Director will be responsible for operating disaster prevention and mitigation of the province. As well as the district, the District Chief Officer as the District Director will carry out the disaster prevention and mitigation in the district.	Village leaders/mayors		
Prevention / Mitigation		Disaster Reduction Plan has the following guiding principles as: (i) disaster reduction should be deeply considered in national economic and social development; (ii) prevention should be taken as the priority in combination with resistance and relief; (iii) the role of science, technology, and education should be incorporated in disaster reduction; (iv) the central and local governments as well as all social sectors should be to reduce disasters; and (v) international exchange and cooperation should be strengthened. Community-based Disaster Reduction Outreach Campaign. A National Disaster Reduction Center of China (NDRCO) serves as a center for disaster information sharing, technical services and emergency relief decision consultancy. Its main functions are to assess and analyze the occurrence and development of major disasters, and provide services on forecast, assessment and supporting disaster reduction decisions and information; to collect and analyze disaster reduction information both at home and abroad for information sharing; to provide technical assistance and supporting decisions for major emergency relief work; to organize international disaster reduction exchanges and cooperation.		HKO monitors wx and initiates issuance of all warnings of sev wx conds. Info distributed to various govt depts and to media. Departmental training programs, capacity building. Success of plan depends on dept officers thoroughly trained on their roles in dealing with emergency situations arising from natural disasters.		National Action Plan on DM establishes the District Disaster Management Committee in all districts; makes identification of the local point in all sectors; develops and establishes early warning and information system in all of 142 districts in country; sets up information network in disaster prone villages; constructs warehouses for storing the emergency assistance materials in all provinces and some disaster prone districts; attends continue public awareness activities with media; widely organizes training on DM for all sectors and levels; organizes simulation exercise with the involvement of rescue team unit in sectors and community; and to raise capacity up on cooperation with other countries in the framework of Asian, Regional and United Nations to exchange information and experiences on DM, establishing systems for hazard assessment and disaster mitigation to ensure fire and road safety for the city of Vientiane, and other major cities and communities.	Reports submitted by relevant departments to GCSeg which are then analyzed and monitored for firm implementation of plans. Implement firmly and effectively the functions and responsibilities of GCSeg.	Structural Designs for flood mitigation, Enhanced public education and awareness, addition of an early warning system	4-Point Plan of Action	Risk analysis through flood hazard mapping, national dam safety pgm, natl hurricane pgm, mitigation planning	Capacity building by offering international courses conducted at the Civil Defence Academy (CDA). The courses offered include, the International Urban Search and Rescue Course, International Fire Fighting Course, International HazMat Course, International Disaster Management Course and International Fire Investigation Course. Besides, overseas participants have also attended the SCDF Basic Officers Course, and the Emergency Response Specialists Course, together with our local trainees.	Conducts the exercise regularly at least two times per year in every provinces and districts to ensure all agencies are familiar with their roles and functions parallel with developing the emergency response teams capabilities. In the regional level, Thailand has sent her response team to participate in ASEAN Regional Disaster Emergency Simulation Exercise which has code name "ARDEX" every year; particularly in this year (2008) ARDEX 06 is hosted by Thailand.	Mitigation activities are those that eliminate or reduce the damaging effects caused by an emergency/disaster occurrence. Included are those long-term activities that lessen the undesirable effects of unavoidable hazards such as establishment and enforcement of building codes, flood plain management, insurance, elevating buildings and public education programs. Hazard Mitigation Plans have been prepared to comply with the Stafford Act and Disaster Mitigation Act of 2000 (DMS 2000). The overall purpose of the plan is to establish a comprehensive hazard mitigation program to reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural and human-caused disasters, at island and village levels.	Flood and storm preparedness and mitigation process, flash flood mitigation in mountainous and midland areas, inundation preparedness and mitigation since inundation occurs annual on large scale, drought, saltwater intrusion, desertification, whirlwinds and hail rain, storm surge, forest fires, landslides, reservoir, industrial production.	
Preparedness		Relevant departments under the State Council have basically completed their emergency-response plans. 31 provinces and 2,347 counties have also released their plans. As a result, a national emergency-response plan management system for natural disasters has already taken shape.		Testing of plans with annual drills	1. National land conservation; observation systems; info/comms integrated DM	Disasters include flood, drought, landslides, as well as unexploded ordinance, fires and other man-made hazards. Fires and traffic accidents cause the greatest loss of life and property. Lao PDR Urban Disaster Mitigation Project (LUDMP) focuses on these two major hazards & generally aims at incorporating risk management and hazard mitigation into the development planning of urban areas in Lao PDR, with the city of Vientiane as the pilot demonstration site.	Achieved by organizing, coordinating, taking part actively in activities related to the civil protection, and cooperating well with relevant departments and agencies of either public or private sector. Includes training.	COOP, DM exercises, training		COOP, Natl Preparedness guidelines, training, disaster prevention plan	X		Preparedness activities serve to develop and enhance capabilities needed in the event of an emergency/disaster. Planning, exercising, training, and developing public information programs and warning systems are among the activities conducted at this phase.		
-Public Education and Awareness		Public awareness by timely reporting of disasters and relevant disaster reduction activities, holding specialized lectures, columns and programs on TV, radio as well as newspapers. Various charity shows for disaster reduction and poverty relief, disaster-reduction summer camping activities for middle school students and national quiz shows on disaster reduction were carried out throughout the country.							Public information campaign on disaster preparedness through promotion of an integrated and coherent strategic public information campaign on disaster preparedness through the conduct of nationwide tsunami and earthquake drills; distribution of posters and flyers on natural hazards; and other EC through the tri-media. Also the development of the web-based Calamidad.ph.	risk reduction, flood insurance, value to society and best practices	Ministry of Home Affairs constantly engages the people through a series of public education programmes to enhance public awareness in emergency preparedness. The Ministry of Home Affairs has established the Community Safety and Security Programme (CSSP), a framework that encourages the community to look after its own safety and security through self-help and mutual support. It also serves to foster community cohesion and harmony among local grassroots leaders, residents, students and workers. "My Ready Mobile"	Mr. Disaster Warning			
Response		A national emergency-response plan system for natural disaster management has been set up. In order to improve various pre-warning and emergency-response mechanisms and governments' capabilities to handle emergencies and risks, the Chinese Government has promulgated the national Natural Disaster Emergency-Response Plan.		Rescue phase objective: rescue of life, protection of property and containment of the situation/incident or prevent any further deterioration.	Disaster emergency response, wide-area support system	Prime Minister set up the ad hoc committee for flood fighting which is presided by Agriculture & Forestry Minister. Role and function of the ad hoc committee is to collaborate with the National Disaster Management Committee for flood prevention and fighting. Response activities may include sand bag supplies, resource mobilization, distribution of relief packages, and more.	Coordination office-GCSeg - mainly deals with the civil protection, including handling all kinds of disasters, and functions as a coordinator to communicate with all parties in regard to the concerned field and collaborate with them, to estimate and prepare all necessary resources required for disaster relief and emergency, to encourage them to establish any necessary measure/mechanism and activities for reducing disasters and their impacts, and so on. Includes medical system for disaster and SAR.	Whenever a severe disaster occurs, meeting at district, state or national levels, will be immediately convened by the Disaster Management and Relief Committee. A Disaster Control and Operation Centre will also be operationalized. The operation of the Disaster Control and Operation Centre will be established based on the disasters which could either be at the District, State or National level. Includes search and rescue operations, needs assessment for provision of medical care and preventing the spread of disease; providing basic needs for procuring and distributing food, shelter and clothing; ensure fair distribution of resources; providing livelihood and economy for assisting people to earn a living to help them recover; emotional support for counselling and reuniting separated families; logistics for transportation of people and equipment; finance for obtaining, allocating and accounting for money; communication for media coverage, information for families, fundraising; and infrastructure for rebuilding damaged infrastructures	National Response plan gives the basics for how the government coordinates with local and tribal governments and the private sector during incidents. Other response include mobile emergency response support, national disaster medical system, and urban search and rescue.		One Tambon One Search and Rescue Team (OTOS)	During a response phase, emergency services during a crisis are provided. These activities help to reduce the loss of life, injuries, damage to the island resources and expedite recovery efforts. Response activities include, but not limited to: warning and evacuation, search and rescue and other functional operations addressed.	Create favourable conditions for people to participate in the development of legal documents, planning, management and monitoring the implementation of programmes and projects in local areas. (i) Foster dissemination activities and community awareness rising. Building capacity for self disaster preparedness, promote the tradition of mutual support in emergency relief operations; Establishment of community voluntary groups to participate in search and rescue operation. Promoting the role of social organizations in preparedness, response and recovery. Develop the volunteer network to assist in dissemination, mobilization, recovery and rehabilitation of production. Encouraging organizations, individuals inside and outside the country to contribute diverse and effective support for people and localities affected by natural disasters; (ii) Reinforcing training of human resources to meet the requirement of disaster prevention, response and mitigation, especially for disaster management, advisory and coordination offices.		
Recovery / Rehabilitation		Since 1998 China began to set up a central-level material reserve system for disaster relief. Central-level material reserve points for disaster relief have been built in Shenyang, Harbin, Tianjin, Zhengzhou, Hefei, Wuhan, Changsha, Nanning, Chengdu and Xian. Provincial-level material reserve warehouses for disaster relief have been set up in almost all of provinces, autonomous regions and municipalities.		Recovery phase: return the community to a condition considered acceptable by the community. Restoration phase: restore the community to the state prior to the disaster.	recovery/rehab countermeasures, etc		In accordance with the Civil Protection Framework, all hygiene departments and agencies in MSAR have been including in the framework to ensure medical services in case of the occurrence of any major emergency and disaster. Community Assistance grant program - government departments or private agencies will provide certain funding supports or accommodation and any other necessary help to victim of disaster in according to each case. In addition, certain large infrastructure programs, community reconstruction programs, other construction works related to the slope safety, coast protection and sanitation network development for better flood mitigation, and so on, are being executed by relevant government departments or have been included in Macao's development plan.	Community assistance programs - public assistance grant program, hazard mitigation grant program.	Continued capacity building. Government forges MOAs with various NOGs covering response, relief and rehabilitation aspects of disaster management such as CALAMIDAT, PH and Program for Hydro-Meteorological Risk Mitigation in Secondary cities in Asia PROMISE project with Center for Disaster Preparedness Foundation, Inc	Community assistance programs activated by a disaster declaration include the public assistance grant program, hazard mitigation grant program, fire management assistance grant program, and the NEMA grant and assistance program.		Disaster Prevention and Mitigation Academy (DPMA) to be the principal academy in the field of disaster prevention and mitigation for equipping the personnel in charge of disaster management with technical know-how and practical skills which will be beneficial to national disaster management	Recovery includes short-term and long-term activities. Short-term recovery seeks to restore critical basic life support systems such as power, water, communications, transportation and medical. Long-term recovery focuses on restoring the affected community to its normal or improved state of affairs prior to the emergency/disaster. The recovery period is an opportune time to establish and implement mitigation measures, particularly those related to the recent emergency/disaster.	"CBDRM" approach has been employed at different levels and in distinctive areas in Vietnam. Deeper research clearly showed that there are common factors between meaning, objective of CBDRM and meaning, objectives, policies and fundamental principles of Vietnamese Government. That is "relying on the people and mainly implemented by the people", fostering grassroots democracy through implementation of "grassroots democracy regulation", principles of "Publicize and socialize flood storm control and disaster mitigation" and "4 on-site motto", sharing resources and collaborative implementation" such as co-funding by Central government and locality in construction of disaster management infrastructures, laid out legal basis for local institutions "participate in monitoring the construction of disaster management works", encourage the adoption of "measures and new-technology solutions". In this view, there has been both "top-down" and "bottom-up" approaches but at different levels. Some cases are still keen on top-down approach as a result of the centralized planning mechanism in the past years that not only partly obstacle but also need the more time for fully applying the CBDRM approach in some case. However, those principles and mottoes have strengthened the responsibility of relevant stakeholders. On the other hand, those have mobilized traditional experience, resources and partly ensure the sustainability and effectiveness of disaster management activities.	
Resources															
Budget							Natl - 4.5 trillion yen			CDIS, NIDP, EHP, NAAT, grants, etc					
										\$300 million dollars					

# Disaster Management Systems

At the 40<sup>th</sup> session of the UNESCAP/WMO Typhoon Committee, the Disaster Prevention and Preparedness Working Group Chairperson assigned two Members of the working group to conduct a comparative study of all Members' Disaster Management Systems (DMS) and Early Warning Systems (EWS) reports.

A Disaster Management System is defined as the strategic plan of a country that addresses every possible disaster that can affect that particular country. While countries vary in size, geography, vulnerability to disasters, political entity, economic structure, and languages, the Disaster Management Systems of each country share many similarities. This report addresses the Disaster Managements Systems of the following TC Members: China, Hong Kong China, Japan, Laos, Macao China, Malaysia, Philippines, Republic of Korea, Singapore, Thailand, USA, and Viet Nam. Reports from Cambodia and the Democratic Peoples Republic of Korea were not available.

The makeup of the DMS focuses on the ways each Member responds and relates to natural disasters. Each report had their specific way of documenting the actions of their country but the basics were addressed in all reports although the terminology would vary from plan to plan. (This report will categorize each Member's DMS and uses the Hyogo Framework for Action (HFA) as a basis of comparison. HFA demonstrates the basic fundamentals of pre-disaster actions (mitigation, planning and preparedness) and the post-disaster actions (response, recovery and rehabilitation). According to the International Strategy for Disaster Reduction (ISDR) web site, the HFA is the key instrument for implementing disaster risk reduction and is adopted by Member states of the United Nations. Its goal is to

build resilience of nations and communities to disasters (Refer to [www.unisdr.org/hfa](http://www.unisdr.org/hfa) for further details). Many countries referred to this in their plans.)

In the Typhoon Committee Integrated Workshop on Beijing (2008.9.22-26), WGDPP Members agreed to develop formatted disaster management system for each TC Members including following contents such as: (i) Introduction (Organization and Framework), (ii) Prevention and Preparedness (Mitigation), (iii) Emergency Response, (iv) Recovery and Rehabilitation, (iv) Capacity Building (Training), (v) Resources (Financial, Information, etc.), (vi) Recent Major Disasters, (vii) Future Programs & Projects for only web-site version; (optional).

The disaster management systems of TC Members were summarized and defined to make guideline of the typhoon related disaster management system. The summary of 12 disaster management systems is described in Table 1. For the summary 12 items are categorized such as geography, Hazards/threats, plan name, legal framework of DMS, policy levels, prevention/mitigation, preparedness, public education and awareness, response, recovery/rehabilitation, resources, and budget which items are selected from 12 disaster management system.

## 1. HAZARD FACED

Emergency response plans of the DMS addressed multi-hazard events that affected each TC Members. The types of hazards faced and the severity of these hazards generally depended on the geographical location of each country. Natural hazards mentioned in the plans include tropical cyclones, heavy/torrential rain, flooding, landslides, storm

surges, forest fires, and droughts. Also noted were man-made disasters associated with industrial pollution, unexploded ordinances and terrorist attacks.

## 2. POLICY LEVELS

All reports referred to a hierarchy of agencies that address natural disasters in the countries. The levels of management of natural disasters begin at the top or the national level. At the national level, the role is to dictate policy and procedure for disaster management. The next level, for this report, will be labeled the “Regional” level and has the mandate to take that policy and address it to regional centers or locations that can vary according to geography or logistical reasons. Then there is the more community based or local level in which the local management takes the regional mandates and tailors them to the community and establishes community-based systems. The response at this localized or community level is designed to address specific areas or groups and become more efficient in reaching the rest of the populace of the country. Not all countries policies are dictated from the top down. For example, the country of VietNam takes both “top-down” and “bottom-up” approaches to disaster planning.

## 3. LEGAL FRAMEWORK

Almost all DMS cited a specific law or decree or act on Disaster reduction/preparedness. Only Singapore DMS report did not mention a legal framework.

## 4. MITIGATION/PREVENTION

Mitigation/Prevention activities are those that eliminate or reduce the damaging effects caused by an emergency/disaster occurrence. It is also embedded in the national economic and social development of each country. Many methods are in place to mitigate disasters. They include early warning systems, strong and reliable forecasts, sound structural designs, enforcement of building codes, and mitigation analysis (such as flood mitigation analysis). For large cities, a smart urban development plan is key.

## 5. PREPAREDNESS

Emergency response plans specify ways to deal with disasters. A large part of the Member reports highlighted these plans and emphasized consistent training programs and frequent drills for the response agencies of their country. Republic of Korea and Malaysia both have a “Continuity of Operations Plan (COOP)” to address situations where the country’s operations must continue despite setbacks from a disaster. Another preparedness activity that rang common through all plans is public awareness and education. Whether it be “grass roots” or a large “media campaigns”, this appears to be an effective way of reaching the public. Countries such as the Philippines, Singapore and Thailand have a specific public awareness campaigns such as calamitat.ph, My Ready Mobile, and Mr. Disaster Warning respectively.

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## 6. RESPONSE

A majority of the reports referred to having an Emergency Response plan in effect during times of disasters. These response plans give the basics for how a country coordinates with local governments and the private sector during incidents and helps the governments handle emergencies in a more effective manner. Other response actions include warnings, evacuations, mobile emergency response support, national disaster medical system, and search and rescue. Using non-government organizations to assist with response activities was another means to maximize the response in natural disasters.

## 7. RECOVERY/REHABILITATION

The recovery and rehabilitation phase is the point where efforts are focused on restoring the community to a condition considered acceptable by the community (short-term) and a more long term goal of restoring the community to its normal or improved state prior to the disaster. Some DMSs specified the many programs available to assist the general populace in reaching that pre-disaster state once again. Community assistance grant programs and reconstruction programs were favorable and identified ways to ensure a population is restored to normalcy and yet equipped with ways to handle the next emergency. This is where capacity building is also emphasized in DMS plans.

# Abstract of the Disaster Management Systems

The Disaster Management Systems (DMSs) of 12 TC Members were collected and analyzed to make the guidelines. The information was subjected to a quality control process managed by the WEB-GIS based TCDIS platform for the promotion of DMS. The first step was an editing process to ensure that information met the basic requirements of relevance and completeness. The second step involved the review and assessment of the information against the guidelines developed by expert reviewer. Also, needs and gaps of participating members in relation to the implementation of the DMS were identified by analysis information collected from each TC Members. The abstracts of DMSs collected from 12 TC Members were reported to shear information and reduce the gap of participating members.

## 1. DISASTER MANAGEMENT SYSTEM OF CHINA

**Country :** China

**Submitting Organizations :**

Department of Water Hazard Research,  
China Institute of Water Resources and  
Hydropower Research

**Primary Contact :** DU Xiao He

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**Abstract :** The principle of disaster management systems of China is parallel development of economy taken into account in constructing production and living facilities and natural disaster reduction. Major priority of disaster management of China is disaster prevention such as disaster resistance and relief to support national economic and social development. The strategic frameworks for the disaster management are (i) for the sustainable development; (ii) for protecting people's lives and properties

by comprehensive disaster-reduction activities; (iii) for the enhanced disaster-reduction awareness of the general public. Multiple methods and monitoring systems were implemented in the disaster management system to carry out disaster-reduction and to display the overall efficiency of various disaster reductions. To set priorities they are considering key issues bearing on the overall interests of disaster reduction in which limited resources are concentrated on strengthening the development of key projects and comprehensive work in key regions focused on natural disasters. The role of science, technology and education are fully represented in disaster management system. The process of transforming existing scientific results into actual capabilities of disaster reduction is accelerated for better abilities to reduce disasters. Disaster-reduction education is integrated with popularized and specialized education oriented towards whole society so as to uplift the level of disaster-reduction knowledge of the general public. All positive elements are mobilized. Initiatives of the central and local governments as well as all social sectors are displayed in the system. Under the unitary organization and deployment of the government, relevant departments coordinate closely with each other and enterprises as well as cross-sections of society are broadly involved for effectively reducing disasters. Administrative divisions for China's disaster management are following as: (i) 23 provinces; (ii) 5 autonomous regions such as Guangxi, Nei Mongol, Ningxia, Xinjiang, and Xizang (Tibet); (iii) 4 municipalities such as Beijing, Chongqing, Shanghai, Tianjin; and (iv) special administrative regions such as Hong Kong, Macao. Multi-channeled and multi-layered international exchanges and cooperation is actively carried out to continuously improve China's disaster-reduction undertakings and China's standing in the international disaster-reduction community.

## 2. DISASTER MANAGEMENT SYSTEM OF HONG KONG, CHINA

**Country :** Hong Kong, China

**Submitting Organizations :**

Assistant Director,  
Hong Kong Observatory

**Primary Contact :** Mingchung Wong

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**Abstract :** Natural disasters that occur in Hong Kong are generally the result of severe weather conditions such as exceptionally heavy rain, storm surges, thunderstorms and tropical cyclones. These events can result in considerable disruption to transport and other essential services and cause floods, landslips and other incidents giving rise to casualties. Tsunami, which is a geophysical hazard that poses a threat to coastal communities worldwide, has a very small chance of affecting Hong Kong significantly. The consequences of any natural disaster and the counter measures required to deal with it will vary according to the circumstances. The Hong Kong Observatory (HKO) monitors weather conditions closely and initiates all warnings of severe weather conditions in Hong Kong. These include tropical cyclone, rainstorm, landslide and thunderstorm warnings. Messages will also be issued giving general advice on precautions to be taken to minimize the loss of life and damage to property, followed by supplementary information and advice as the situation develops. The warnings will be disseminated to relevant responding bureaux/departments and other related parties according to the prescribed alerting arrangement in the CPND. In addition to the CPND, each government bureau /department has its own detailed operational instructions to implement the contingency plan. A

contingency plan entitled "Contingency Plan for Natural Disasters" summarizes the alerting systems and organisational framework of the Hong Kong Special Administrative Region Government (hereafter denoted as Government) for responding to such disasters. Functions and responsibilities of Government departments and other bodies in the event of natural disasters including those resulting from severe weather conditions are also set out in the Contingency Plan. In addition to the Contingency Plan, each department has its own detailed operational instructions. The Contingency Plan for Natural Disasters in Hong Kong is available at <http://www.sb.gov.hk/eng/emergency/index.htm>.

## 3. DISASTER MANAGEMENT SYSTEM OF JAPAN

**Country :** Japan

**Submitting Organizations :**

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Disaster Management Cabinet Office,  
Gov. of Japan

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**Abstract :** To protect national land as well as citizens' lives, livelihoods, and property from natural disasters is a national priority. The turning point for strengthening the disaster management system came after the immense damage caused by the Isewan Typhoon in 1959, and led to the enactment of the Disaster Countermeasures Basic Act in 1961, which formulates a comprehensive and strategic disaster management system. Main contents of the Disaster Countermeasures Basic Act is (i) definition of responsibilities for disaster management, (ii) dis-



aster management organizations, (iii) disaster management planning system, (iv) disaster prevention and preparedness, (v) disaster emergency response, (vi) disaster recovery and rehabilitation, (vii) financial measures, and (viii) state of disaster emergency. The disaster management system has been further strengthened following the lessons learned from large-scale disasters such as the Great Hanshin-Awaji Earthquake. Japan's disaster management system addresses all of the disaster phases of prevention, mitigation and preparedness, emergency response as well as recovery and rehabilitation. With clear roles and responsibilities of the national and local governments, the relevant stakeholders of the public and private sectors cooperate in implementing various disaster countermeasures.

#### 4. DISASTER MANAGEMENT SYSTEM OF LAO PEOPLE'S DEMOCRATIC REPUBLIC

**Country :** Lao People's Democratic Republic

**Submitting Organizations :**

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**Abstract :** National Disaster Management Office (NDMO) has took the data of weather forecasting from Meteorology and Hydrology Department, Mekong River Commission and getting news from international mass media. While data and information collected, NDMO will be providing through network agency of provincial disaster management coordinator which located along the Mekong River where prone to flooding. NDMO will be core agency of checking up information through media for instance: National Television Broadcasting, News-

paper, National Radio and Provincials located by the side of Mekong River. Prime Minister was setting up the ad hoc committee for flood fighting in the year 2002 which presided by Agriculture & Forestry Minister. Role and function of the ad hoc committee is to collaborate with the National Disaster Management Committee for flood prevention and fighting. The ad hoc committee for flood fighting met Vientiane authority officials and districts to make a flood prevention plan for instance: (i) proof of embankment along Mekong River, (ii) set up teams to monitor water level and water gate and other areas which embankment are weak by encourage local security guards to collaborate with district police for watching throughout 24 hours. The inspection Committee was also set up in order to do daily follow up issues with consists of various government agencies. Proofing of embankment and water gate had been carried out under the Agriculture sector to provide mechanic. Transportation and communication section in charge of sand supplier and Labour & Social Sector was a sand-bag supplier. Mass media is a core point for stimulation of sand-bags and kinds contribution from NGOs and private sectors and etc. Dried food, rice, pure water and other nutrients are also donated to the flood victims by the Disaster Management Committee. Boat mobilize force which get collaborated by private sectors & village security guards to evacuate people, animals and needed things in flooded area along river bank. Beside that those force also mobilized food, pure water and medicines to distribute to flood victims at temporary sites. At the district and village level was encouraging the youth forces and volunteers to work on improving embankment and set up team to give watching through 24 hours. Chairman and members of flood relief committee distributed relief packages and medicines to flood victims in 4 districts and Ministry of Agriculture had distributed

organic fertilizers, vegetable, rice and corn seeds to various villages for replanting after flood.

## 5. DISASTER MANAGEMENT SYSTEM OF MACAO, CHINA

**Country :** Macao, China

**Submitting Organizations :**

Superintendent, Administration Clerk

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**Abstract :** As a special administrative region of government in Macao, China always dedicates efforts to supporting Macao's sustainable development and social stability, while also making effort on the enhancement of civil protection affairs. In the aspect of civil protection, a series of laws concerning natural disasters, including a decree-law emphasized on the civil protection, the Internal Security Legal Framework, an executive order on approval of the symbol and meaning of typhoon in different scales as well as the instructions in response to various typhoon, a dispatch on stipulating the response to different scales of typhoon and rainstorm specially for schools and students, a dispatch on prescribing the response to the typhoon for public sector and entities, and so on, have been established. Decree-Law no. 72/92/M, 28 September 1992 is a law formulated for civil aid, particularly during the occurrences of any serious incident or disaster and, which may put masses or certain number of people in danger. Law no. 9/2002, "Internal Security Legal Framework" is a law mainly for ensuring the social order and stability. Executive Order no. 16/2000, some basic concepts relating to typhoons, including the symbols of different typhoon signals and their meanings have been well defined. Executive Dis-

patch no. 166/2002, contains certain directives for all public departments or entities to follow or perform when there is typhoon signal no. 8 or above issued, and to consider further appropriate policies and mechanism respectively to ensure the Civil Protection Framework to be activated effectively if required.

## 6. DISASTER MANAGEMENT SYSTEM OF MALAYSIA

**Country :** Malaysia

**Submitting Organizations :**

Department of Irrigation and Drainage,  
Hydrology and Water Resources Division

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**Abstract :** Special Malaysia Disaster Assistance And Rescue Team (SMART) was established in 1995 (NSC Directive No.19). It is responsible to the Director, Crisis and Disaster Management Unit, NSD. SMART comprises of 85 officers and personnel from the Fire and Rescue Department, Royal Malaysia Police and the Armed Forces. The decision on the mobilization and the deployment of the SMART team is made by the Director, General of the NSD or the Director, Crisis and Disaster Management Unit provides decision making on the mobilization and the deployment of the SMART team. Malaysian Meteorological Service (MMS) provides information and warning occurrences and adverse weather phenomena to the general public through the mass media or to other government agencies directly involved in disaster mitigation. A Central Forecasting Office has been established in the Meteorological. Drainage And Irrigation Department Of Malaysia (DID) takes charge of: flood Control Mea-

sures, coordinate flood relief operations at federal, state and district levels in coordination with the National Disaster Management and Relief Committee in 1997, implementation of structural flood mitigation measures, provision of flood forecasting and warning services, and flood forecasting and warning services (FFW). Social Welfare Department is the main organization in charge of disaster relief and rehabilitation works (NSC Directive No. 20 on Policy and Mechanism of Disaster Management and Relief).

## 7. DISASTER MANAGEMENT SYSTEM IN PHILIPPINE

**Country :** Philippine

**Submitting Organizations :**

Department of National Defense,  
National Disaster Coordinating Council

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**Abstract :** The Decree promulgated on June 11, 1978 calls for the strengthening of the Philippine disaster control capability and establishing the national program on community based disaster preparedness. Salient provisions include among others following as: (i) state policy on self-reliance among local officials and their constituents in preparing for, responding to and recovering from disasters; (ii) organization of the National, Regional and Local disaster coordinating councils (DCCs); (iii) preparation of the National Calamities and Disaster Preparedness Plan (NCDPP) by the Office of Civil Defense and implementing plans by the NDCC member agencies and local DCCs; (iv) conduct of periodic drills and exercises by concerned agencies and local DCCs; (v) authority for the local government units to program

funds for disaster preparedness activities such as the organization of DCCs, establishment of Disaster Operations Center (DOC) and training and equipping of DCC response teams. This is in addition to the 5% under Section 324 (d) of the Local Government Code of 1991, as amended. Under the implementing rules and regulations (IRR) of PD 1566, the disaster management activities of DCC member-agencies as well as procedures and guidelines for inter-agency coordination and dissemination of information during the three phases are defined.

## 8. DISASTER MANAGEMENT SYSTEM OF REPUBLIC OF KOREA

**Country :** Korea

**Submitting Organizations :**

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National Emergency Management  
Agency

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**Abstract :** Administrative divisions in disaster management system of Republic of Korea have 9 provinces and 7 metropolitan cities. Laws related with natural disasters include the Natural Disaster Countermeasures Act, Act on Countermeasures against Agricultural and Fishery Disasters, Disaster Relief Act, etc. The Natural Disaster Countermeasures Act (enacted in 1995) prescribes control of and countermeasures against natural disasters such as torrential rain and typhoons, investigations of relevant damage, rehabilitation costs, etc. The Act on Countermeasures against Agricultural and Fishery Disasters (also enacted in 1995) stipulates measures concerning prevention of and countermeasures against disasters affecting agriculture and fishery

such as damage from disease, harmful pests and drought. The Disaster Relief Act (enacted in 1962) provides for relief of victims of natural disasters or calamities, etc. From June 1, 2004 the Disaster and Safety Management Basic Law is enacted designating disaster management competent organizations based on the disaster definition, identifying the Central Safety Management Committee, establishing rapid information dissemination system, and enhancing disaster-related research functions. Water resources and land use planning are managed by the Ministry of Land, Transport and Maritime Affairs. Health, environment, education, and finance are managed by the Ministry of Health, Welfare, and Family Affairs, Ministry of Environment, and Ministry of Strategy and Finance, respectively.

## 9. DISASTER MANAGEMENT SYSTEM IN SINGAPORE

**Country :** Singapore

**Submitting Organizations :**

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Meteorological Services

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**Abstract :** Singapore is a small city-state with a land surface area of 707 square kilometers, geographically located outside the 'Pacific Rim of Fire'. While it is spared from natural disasters such as tsunamis, earthquakes, and volcanic eruptions, it is not entirely safe from man-made disasters. The Singapore Civil Defense Force (SCDF), the nation's emergency service provider, has been charged with the task of preventing and mitigating such man-made disasters in a highly urbanized environment with many high-rise buildings and Hazardous Mate-

rial industries. The global threat of terrorism loomed large in recent years, and this has also added a new dimension to emergency preparedness and response for Singapore. In Singapore, Ministry of Home Affairs (MHA) is the principal policy-making and directing authority responsible for civil defense, emergency preparedness and disaster management in Singapore. Under its command, the Singapore Civil Defense Force (SCDF) is the national authority that will coordinate, plan, command and control all operations undertaken by the HomeFront agencies to mitigate major disasters.

## 10. DISASTER MANAGEMENT SYSTEM OF THAILAND

**Country :** Thailand

**Submitting Organizations :**

Chief, Foreign Relations Sub-Bureau

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**Abstract :** Disaster management system in Thailand has mainly based on Civil Defense Act of 1979 and the Civil Defense Plan 2002. The Natural Civil Defense Committee (NCDC) is the main policy making body. Prior to October 2002, the erstwhile Civil Defense Division of Department of Provincial Administration (the then Department of Local Administration, Ministry of Interior), had been in charge of the Nation Civil Defense Committee Secretariat. After October 2, 2002 Thai government has enacted the Bureaucrat Reform Act 2002, Department of Disaster Prevention and Mitigation (DDPM), has come into existence under the umbrella of Ministry of Interior and has been designated to shoulder responsibility of disaster management of the country and has thus, replaced the former Civil Defense

Division as the National Civil Defence Committee Secretariat. In 2002, Thailand established the Department of Disaster Prevention and Mitigation (DDPM), under the Ministry of Interior, as the principal agency for disaster management coordination among all agencies concerned at all levels. As regards disaster risk reduction, DDPM shall conduct activities in coordination with other agencies. The National Civil Defence Committee performs all functions relevant to management of disaster at national level. Apart from National Civil Defence Committee, Thailand has another disaster management related mechanism which has highlighted its tasks and responsibility on man-made disaster management only... that is "The National Safety Council of Thailand" (NSCT). The NSCT has been established in 1982 on the ground of the problem of road traffic accidents in Thailand which annually resulted in the tremendous loss of lives, properties and national economy. The National Disaster Warning Center was established under the Order of the Office of the Prime Minister. It is a Prime Minister Thaksin Shinawatra's commitments to protect lives and properties of Thai people and foreign visitors by setting up the National Warning Center as soon as possible.

## 11. DISASTER MANAGEMENT SYSTEM OF USA

**Country :** USA

**Submitting Organizations :**

Meteorologist-in-Charge  
Weather Forecast Office (WFO)

**Primary Contact :** Genevieve C. Miller  
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Tel: +67 1 4720944

**Abstract :** The United States-affiliated Islands in the western North Pacific consist of the US Territory

of Guam, the Commonwealth of the Northern Marianas Islands, the Republic of Palau, the Federated States of Micronesia and the Republic of the Marshall Islands. These islands have historically received Disaster Management training and support from the National Weather Service through the Weather Forecast Office (WFO) Guam and from the Federal Emergency Management Agency (FEMA). Occasionally, the islands also receive training from the South Pacific Geosciences Commission (SOPAC). They have also historically received Disaster Recovery and Mitigation assistance from the FEMA, pending a Disaster Declaration by the US President in response to a request for assistance. By late 2008, disaster assistance for the Republic of Palau, the Republic of Marshall Islands and the Federated States of Micronesia will be provided by the US Agency for International Development (USAID) Office of Foreign Disaster Assistance (OFDA). USAID is an independent federal government agency that receives overall foreign policy guidance from the Secretary of State and extends assistance to countries recovering from disaster, trying to escape poverty, and engaging in democratic reforms.

## 12. DISASTER MANAGEMENT SYSTEM OF VIET NAM

**Country :** Viet Nam

**Submitting Organizations :**

Dept. DYKE Management

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**Abstract :** At the Central level, the National Committee, an inter-ministerial institution serves as a coordinating body for disaster reduction efforts in Viet Nam. Its secretariat is provided by the Depart-

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ment of Dike Management and Flood Control (DDMFC) of the Ministry of Agriculture and Rural Development (MARD). The CCSFC formulates all regulations and mitigation measures related to typhoons and floods. Emphasis is on dike protection, surveillance and maintenance. Local emergency work is coordinated by the provincial CSFC. First National Strategy and Action Plan for Mitigating Water Disaster was prepared in 1994 through a national consultation process. It identified the need for a multi-sectoral and multi-disciplinary approach to disaster management (engineering, institutional

and social) measures to reduce the vulnerability of the country and improve its capacity to cope with the adverse impacts of natural threats. It serves as a basis for annual state plans. The plan has strengthened institutions for disaster mitigation and management. Second Strategic Action Plan (2001-2020) set up several strategies in disaster mitigation and management that aim 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.



# Suggestions

## 1. IMPORTANT OF DISASTER RELATED INFORMATION

The typhoon related disaster Information is key factor for the successful disaster management system. The TC Members used two categorized data set to manage the typhoon related disasters which pre-disaster data such as country or national information are used for base data for the risk assessment, disaster prevention and preparedness and risk related information and post-disaster data such as the impact of a disaster and available resources are used for the response for disasters, rehabilitation, and reconstruction of damages. The disaster management system obtained from 12 TC Members categorize the data following two parts of systems as: (i) pre-disaster management system for analysis and research to improve the existing knowledge based system, risk assessment, disaster prevention and preparedness, disaster mitigation and (ii) post-disaster management system for response, rehabilitation, and reconstruction of damages.

The Integration or combine the typhoon related disaster information for the analysis and regional cooperation among the affected countries is another important key factor for effective response to typhoon. The cross-sectoral integration of disaster related information is key factor to make decisions related in risk analyzing and deciding upon appropriate counter-measures. For example, the integrated analysis on flood disaster related data such as meteorology, topography, soil characteristics, vegetation, hydrology, settlements, infrastructure, transportation, population, socio-economics, and material resources is possible to make fully understanding

of flood aspects and making a plan or decision to reduce damages due to flood disaster. This information comes from many different organizations and even different countries which typhoon has no geographical boundaries and bring havoc to very large areas and at present it is difficult in most countries of the TC Members to bring it all together. The information system is needed for effective response to typhoon including tropical cyclones calls for regional cooperation among the affected countries.

Two essential things such as defining the purpose of the system and investigating the existing databases and integrating with them are prerequisite to establish a disaster management information system. Defining the purpose of the system are including (i) The main users and what end product do they require is decided for the system; (ii) The system must be appropriate to the level of management at which it is used; and (iii) Failure to have a very clear idea of the purpose of the system is likely to lead to the creation of an unnecessarily elaborate one which attempts to do more than is really necessary, with the attendant risks of it being costly, time consuming to maintain, the data being out of date and the system itself being inappropriate to the real needs of its users. Investigating the existing databases and integrating with them is also important because (i) Often the information needs of disaster managers overlap those of other organizations and the data may, therefore, already be stored elsewhere; (ii) Disaster managers should resist the temptation to establish their own all embracing database; (iii) At the national level there are almost certainly existing databases for a wide variety of purposes.

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## 2. COMPONENTS OF A NATIONAL DISASTER MANAGEMENT INFORMATION SYSTEM

Key components of a disaster management information system would be a database of (i) hazard assessment mapping, (ii) vulnerability assessment; (iii) demographic distribution; (iv) infrastructure, life-lines, and critical facilities; (v) logistics and transportation routes; (vi) human and material response resources; and (vii) communication facilities. The usage of disaster management information systems (DMIS) would be in 3 contexts such as preparedness planning, mitigation, and response and recov-

ery. The hazard and vulnerability assessments and mapping components of a DMIS are the cornerstone of preparedness planning as well as planning and implementation of a mitigation program. All data is of critical use in the preparedness plan as well as in the actual response operations. It must be recognized that the development of these databases in country has to be built bottom up from the lowest administrative unit in country i.e. the sub-district and district corresponding to the level of the disaster preparedness plan. The district databases would feed into the state/provincial database and then into the national database.

## Conclusions

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The DMSs of 12 TC Members were collected and analyzed to make the guidelines to consider all elements of effective disaster management system such as the assessment of risk, the technical warning service, the communication needs, and the preparedness of those at risk. The information was subjected to a quality control process managed by the WEB-GIS based TCDIS platform for the promotion of DMS. The first step was an editing process to ensure that information met the basic requirements of relevance and completeness. The second step involved the review and assessment of the information against the guidelines developed by expert reviewers. Also, needs and gaps of participating members in relation to the implementation of the DMSs were identified by analysis information collected from each country. The summary of 12 DMSs and all information collected from 12 TC Members were uploaded in the WEB-GIS based TCDIS and all information of DMSs were also reported in Appendix to shear information and reduce the gap of participating members. The summary of DMSs, abstracts, remarks, and suggestions reported in this study will help to reduce the gap of participating members and to reduce the typhoon related damages.

Summarizing each TC Members DMS proved to be challenging merely because not all plans were composed in the same format. As a result, perusing each document to determine similar structures was the most time consuming task. An easier approach would be to have each WGDPP Member subscribe to reporting their countries DMS in an agreed format so that all reports can be compared equitably. Because of this, it would be wrong to assume that any DMS was lacking in substance. What may be important and specific in one Member's DMS may not be as important nor included in another. Yet it was clear that the DMSs were at different stages of development with some countries just formulating their DMS (especially after the HFA) while others steadily improved upon theirs. It came as no surprise that the political makeup of each country would affect the way the DMS would be enacted however all the reports showed that each country understood the need to address disasters, both natural and man-made, and have made strides to accomplish this. Because every country has experienced a disaster some time or another, each country understood the importance of having a plan in place with the greater emphasis on saving lives and property. That is the underlying theme in all DMSs.

# References

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The International Strategy for Disaster Reduction (ISDR) [www.unisdr.org/hfa](http://www.unisdr.org/hfa)

UN ESCAP/WMO Typhoon Committee, [www.typhooncommittee.org](http://www.typhooncommittee.org)

United Nations ESCAP, [www.unescap.org](http://www.unescap.org)



# **Report on UN ESCAP / WMO Typhoon Committee Members Disaster Management System**

## **Appendix**

**January 2009**







CHINA

## Introduction

The vast territory of China experiences frequent natural disasters, including floods, droughts, earthquakes, forest fires, snow, typhoons, and marine disasters. Flooding is the most serious. Almost every year, China is affected by severe flooding, which causes considerable economic loss and serious damage to towns and farms. The frequency of occurrence of flood disasters in China is higher than the world average (Zhang, 1995).

### 1. Organizations of the National Emergency Management Agency

China has more than 30 laws and regulations have been promulgated and implemented on disaster reduction, which administrative divisions include the following as 22 provinces (sheng, singular and plural), 5 autonomous regions (zizhiqu, singular and plural), and 4 municipalities (shi, singular and plural). 2 Special Administrative Regions (tebiexingzhengqu, singular and plural), Autonomous regions: Nei Mongol, Guangxi, Xizang (Tibet), Ningxia, Xinjiang. Municipalities: Beijing, Tianjin, Shanghai, Chongqing. Special Administrative Regions: Hong Kong, Macao. Also, China has a well established institutional and legal framework for disaster management.

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### 1. Legal system

All laws and regulations have legalized China's undertakings in water and soil conservation, earthquake prevention and disaster reduction, fire-fighting, flood-prevention and meteorology, and the working pattern of reducing disasters. There are five laws and three regulations in China such as: Law on Water and Soil Conservation, Law on Earthquake Prevention and Disaster Reduction, Law on

Fire-Fighting, Meteorological Law, Law on Production Safety, Regulation on Forest Fire-Fighting, the Regulation on Preventing Forest Pests, and Regulation on Safety Management of Dangerous Chemicals

### 2. Structure of disaster management

China National Commission for the International Decade on Natural Disaster Reduction was established in 1989. In 2000, it was renamed China Commission for International Disaster Reduction. In January of 2005, it was renamed as China National Committee for Disaster Reduction (NCDR), headed by a Vice Premier of the State Council. It is composed of 34 ministries and departments, including relevant military agencies and social groups. It functions as an inter-agency coordination body under the State Council, which is responsible for studying and formulating principles, policies and plans for disaster reduction, coordinating major disaster activities, giving guidance to local governments in their disaster reduction work, and promoting international exchanges and cooperation. Moreover, the leadership of the disaster reduction and relief efforts has been improved with the establishment of an expert panel consisting of 18 academicians and renowned experts.

## Priorities on disaster risk management

The principle of putting people's interests first and the scientific concept of development should be carried out. Disaster reduction should be secured with an important status in national economic and social development. The principle of parallel development of economy and natural disaster reduction should be followed. Disaster reduction should be included in the strategic framework of sustainable development. A series of comprehensive disaster-reduction activities should be adopted to protect

people's lives and properties.

Disaster prevention should be the major priority in combination with disaster resistance and relief. The disaster-reduction awareness of the general public should be further enhanced. Disaster reduction should be taken into account in constructing production and living facilities. Multiple methods and measure should be implemented to carry out disaster-reduction projects so as to display the overall efficiency of various disaster-reduction projects and step up relevant undertakings.

Overall interests should be borne in mind with set priorities. Key issues bearing on the overall interests of disaster reduction should be well settled. Limited resources should be concentrated on strengthening the development of key projects and comprehensive work on reducing disasters in key regions. Focus should be put on reducing natural disasters having major overall or regional impacts. In the meantime, efforts should be made to explore effective ways to reduce other natural disasters.

The role of science, technology and education should be fully displayed in disaster reduction. The process of transforming existing scientific results into actual capabilities of disaster reduction should be accelerated for better abilities to reduce disasters. Disaster-reduction education should be integrated with popularized and specialized education oriented towards whole society so as to uplift the level of disaster-reduction knowledge of the general public.

All positive elements should be mobilized. Initiatives of the central and local governments as well as all social sectors should be displayed. Under the unitary organization and deployment of the government, relevant departments should coordinate closely with each other and enterprises as well as cross-sections of society should be broadly involved for effectively reducing disasters.

International exchanges and cooperation on disaster reduction should be strengthened. Multi-channeled and multi-layered international exchanges and cooperation should be actively carried out to continuously improve China's disaster-reduction undertakings and China's standing in the international disaster-reduction community.

## Preparedness and Training

Community-based Disaster Reduction Outreach Campaign has been launched, handbook series of Save Yourself From Disaster published and TV promotion of Emergency Rescue broadcast—all of which have gone a long way with enhancing the public awareness. Information dissemination and education programs have been carried out at the local level, focusing on “disaster reduction and the community”, “disaster reduction in classrooms” and “disaster reduction in the rural areas”. Thereby, China has been disseminating knowledge related to disaster reduction, raise public awareness for disaster reduction, strengthen vocational training for the managerial staff, build a pool of volunteers, and improve the overall knowledge base of the general public for disaster prevention, in an effort to set up a disaster prevention and disaster reduction network engaging the whole society.

As part of the endeavors to bring closer and stronger international cooperation, China has been a signing party to The SCO Agreement on Inter-governmental Mutual Assistance for Disaster Relief, attended World Disaster Reduction Conference and sponsored the Asian Conference on Disaster Reduction, the first ever ministerial meeting of its kind in Asia. On top of that, China has provided relevant training programs for 31 officials from 11 tsunami-hit countries and organized governmental and non-governmental donation programs in the wake of the earthquake-turned tsunami in the Indian Ocean and the devastating earthquake in Pak-

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istan.

A National Disaster Reduction Center of China (NDRCC) has been set up. In April 2002 the Chinese Government approved the founding of the National Disaster Reduction Center, which serves as a center for disaster information sharing, technical services and emergency relief decision consultancy. Its main functions are specified as follows: to assess and analyze the occurrence and development of major disasters, and provide services on forecast, assessment and supporting disaster reduction decisions and information; to collect and analyze disaster reduction information both at home and abroad for information sharing; to provide technical assistance and supporting decisions for major emergency relief work; to organize international disaster reduction exchanges and cooperation.

The Chinese Government has raised public awareness by timely reporting of disasters and relevant disaster reduction activities, holding specialized lectures, columns and programs on TV, radio as well as newspapers. Various charity shows for disaster reduction and poverty relief, disaster-reduction summer camping activities for middle school students and national quiz shows on disaster reduction were carried out throughout the country.

In line with the theme of the International Day of Disaster Reduction, multiple publicity campaigns on disaster reduction were launched. Educational departments were added into the curriculum disaster-reduction knowledge in primary and middle schools. In higher education, different levels of disaster-reduction education have been carried out in combination with disaster-reduction research.

A national emergency-response plan system for natural disaster management has been set up. In order to improve various pre-warning and emergency-response mechanisms and governments' capabilities to handle emergencies and risks, the Chinese Government has promulgated the national Natural Disaster Emergency-Response Plan.

Relevant departments under the State Council have basically completed their emergency-response plans. 31 provinces and 2,347 counties have also released their plans. As a result, a national emergency-response plan management system for natural disasters has already taken shape.

Since 1998 China began to set up a central-level material reserve system for disaster relief. Central-level material reserve points for disaster relief have been built in Shenyang, Harbin, Tianjin, Zhengzhou, Hefei, Wuhan, Changsha, Nanning, Chengdu and Xian. Provincial-level material reserve warehouses for disaster relief have been set up in almost all of provinces, autonomous regions and municipalities.

## Disaster Management Plan

In April 1998, the Chinese Government promulgated the National Natural Disaster Reduction Plan of the People's Republic of China (1998 -2010), the first national disaster reduction plan formulated in accordance with the Ninth Five-Year National Economic and Social Development Plan and the 2010 Long-term Objective. It is based on past experiences to carry out its disaster reduction work. The Disaster Reduction Plan has identified the following guiding principles as: (i) disaster reduction should be deeply considered in national economic and social development; (ii) prevention should be taken as the priority in combination with resistance and relief; (iii) the role of science, technology, and education should be incorporated in disaster reduction; (vi) the central and local governments as well as all social sectors should be to reduce disasters; and (v) International exchange and cooperation should be strengthened.

Key disaster reduction projects which have a bearing on the overall interests of national economy and social progress are to (i) widely apply disaster-reduction technology; (ii) make a enhancement of

public awareness and knowledge; (iii) set up a comprehensive working mechanism to alleviate impacts inflicted by disasters on the national economic and social development; and (iv) reduce direct economic losses and human casualties.

The Disaster Reduction Plan has also put forward the tasks of various key players, measures and major actions on disaster reduction. After its promulgation, it has been actively implemented while relevant departments and localities are accelerating their corresponding plans and implementation

details.

## Resources

In 2005, The MCA has collaborated with relevant departments to earmark RMB 8.7 billion as the central budget for disaster rescue and relief initiatives, of which the MCA and the Ministry of Finance contributed RMB 4.048 billion in total to the reserve pool for devastating disaster relief programs.

## Recent major disasters

**Table A-1. Recent major disasters (EM-DAT)**

Year	Disaster subset	Killed	Injured	Total affected people	Damage (US '000s)
2004	Flood	133	4026	33,652,026	1,100,000
2005	Flood	58	0	11,230,000	-
2005	Flood	138	0	16,700,000	1,600,000
2005	Flood	65	0	428,000	27,000
2004	Typhoon	188	4000	9,062,000	2,190,000
2005	Winter	36	0	8,000,000	300,000
2005	Storm	19	55	458,855	16,915
2005	Storm	0	0	90,000	6,000
2005	Typhoon	9	0	13,000	260,000
2005	Storm	8	223	825,223	-
2005	Typhoon	6	0	9,160,000	808,000
2005	Typhoon	159	0	19,624,000	1,900,000
2005	Typhoon	14	0	1,350,000	-
2005	Tropical storm	9	0	5,719,000	-
2005	Typhoon	95	0	2,487,000	148,000
2006	Typhoon	483		5,994,000	19.50 billion RMB
2006	Tropical storm	843		29,554,000	35.10 billion RMB
2006	Typhoon	36		11,063,000	8.46 billion RMB
2006	Heavy rainfall	31		4,177,000	7.28 billion RMB
2006	Typhoon	64		8,420,000	6.18 billion RMB
2006	Typhoon	96		10,893,000	7.26 billion RMB

At 11:50, January 10, 1998, an earthquake (M6.2) occurred in the bordering area between Zhangbei County and Shangyi County in Hebei Province and four counties were affected. 136,000 houses collapsed, 49 were dead, 11,479 people injured. Some facilities for livelihood and production were seriously damaged. Within 5 minutes upon earthquake occurrence, the key staff members responsible for emergency response, earthquake analysis and forecast in China Seismological Bureau (CSB) were in their posts. The epic-center was located within 20 minutes after the tremors. It was announced after two and half hours by CSB that aftershocks would not yield serious effect on Beijing. The local governments and disaster reduction departments immediately implemented the emergency response pre-plan for earthquake and entered into the working situation after 20 minutes of the tremors.

Hundreds of cadres were immediately divided into 6 groups and rushed into the disaster areas to conduct rescue and disaster relief operations, resettle victims and popularize the knowledge for earthquake prevention and resistance. In the afternoon of the earthquake day, Hebei Provincial Government sent work and medical teams to the disaster area. 2,000 PLA personnel rushed into the disaster stricken areas for carrying out rescue work. Tens of media agencies sent reporters to the disaster areas

to make timely report of the disaster combat and rescue works. At 18 O'clock of the very day, the first lots of winter clothes were dispatched to the victims. Before 12 O'clock on January 11, the relief materials from Beijing, Tianjin, Zhangjiakou and Langfang arrived in the disaster areas one after another. On January 14, all the disaster victims had got winter clothes, food, temporary frost-proof shelters and the medical services. From January 15, about 3,000 PLA officers and soldiers were urgently sent to help more than forty thousand disaster victims to build houses for winter; the work was completed in February. Because of the timely response and effective measures, nobody died of frost and hungry under a temperature of 20-30 C (below zero).

## References

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HONG KONG, CHINA

## Introduction

Natural disasters that occur in Hong Kong are generally the result of severe weather conditions such as exceptionally heavy rain, storm surges, thunderstorms and tropical cyclones. These events can result in considerable disruption to transport and other essential services and cause floods, landslips and other incidents giving rise to casualties. Tsunami, which is a geophysical hazard that poses a threat to coastal communities worldwide, has a very small chance of affecting Hong Kong significantly. The consequences of any natural disaster and the counter measures required to deal with it will vary according to the circumstances.

A contingency plan entitled “Contingency Plan for Natural Disasters” summarizes the alerting systems and organisational framework of the Hong Kong Special Administrative Region Government (hereafter denoted as Government) for responding to such disasters. Functions and responsibilities of Government departments and other bodies in the event of natural disasters including those resulting from severe weather conditions are also set out in the Contingency Plan.

In addition to the Contingency Plan, each department has its own detailed operational instructions.

The Contingency Plan for Natural Disasters in Hong Kong is available at  
<http://www.sb.gov.hk/eng/emergency/index.htm>

## Prevention and Preparedness (Mitigation)

The Hong Kong Observatory (HKO) monitors weather conditions closely and initiates issue of all warnings of severe weather conditions, indicating where and when the event will occur, how long it will last and what consequences are expected. Messages will also be issued giving general advice on precautions to be taken to minimise the loss of life and damage to property, followed by supplementary information and advice as the situation develops. The HKO will also issue, to the media and various Government departments, hourly summaries of the weather warnings whenever Tropical

Cyclone Warning Signals, Rainstorm Warning Signals or Landslip Warnings are in force. The HKO will, in addition, send these summaries by fax every hour to EMSC, PHQCCC, FSCC and ISD (please refer to the List of Abbreviations for a list of abbreviations used in this Plan). The HKO will also inform AAHK via HKO Airport Meteorological Office of the latest Tropical Cyclone Warning Signals, Strong Monsoon Signal and Rainstorm Signals by fax or appropriate means. These warnings will then be disseminated by ISD, the SBDO/EMSC, the Police, FSD, TD, MD, AAHK, PCCW-HKT and other parties according to the **Full Alerting System** set out in **Annex E**. The HKO also monitors the occurrence of earthquake-generated tsunamis, and issue Tsunami Warnings indicating the estimated time of arrival of the tsunami at Hong Kong. As communities vulnerable to storm surges due to approaching tropical cyclones are also vulnerable to tsunamis, the alerting system for tsunamis is the same as that for tropical cyclones (i.e. **Annex E**). Upon receipt of these weather warnings or tsunami warnings, and any other messages received, the listed organisations will take effect any necessary action specified in the Contingency Plan and in their own detailed operational instructions. A full list of emergency contact telephone, facsimile and radio telephone numbers is provided in the “Hong Kong Emergency Telephone Directory”. This Directory is a Restricted document.

HAD will handle public enquiries. ISD will deal with the media generally, although Police Public Relations Branch will handle operational matters such as traffic accidents, traffic congestion, road diversions and road closures. The media, public and other outside parties should not contact, or be referred to, SBDO/EMSC or HKO.

The HKO will maintain close regular contact on the weather or tsunami situation with the SBDO, or with EMSC if it has been activated. As regards the latest effects of inclement weather or a tsunami, the ISD, HAD HQ, PHQCCC, FSCC, CEDD, DSD, HyD, DEVB, TD, MD, Lands D, HA, EDB and SWD should all keep SBDO/EMSC and each other fully and proactively informed. This will enable all parties to respond quickly and effectively in a co-ordinated manner. It will also enable SBDO/EMSC to collate all available information; monitor the situation as it

develops; identify problems; and ensure that departments receive any support necessary.

## Emergency Response

### 1. Tropical Cyclones - Warnings and Action to be taken

#### Tropical Cyclone Warnings

Tropical cyclone advisories and/or warnings are issued by the HKO, via ISD, whenever a tropical cyclone is within 800 km of Hong Kong and may affect Hong Kong. Such advisories and/or warnings include the name of the tropical cyclone, the number of the tropical cyclone signal issued and advice on the precautionary measures that the public should take, including, when appropriate, advice on the timing of possible sea flooding due to storm surges. **Annex A** describes in full Hong Kong's **Tropical Cyclone Warning Signal System**, and the respective meanings of the various signals, and gives some advice on precautionary measures. It also includes some sample warning messages.

#### Broadcast of Special Advisory and Warning Messages

When a **No. 3 Signal or higher** is issued, SWD must decide and advise ISD whether day nurseries, day crèches, sheltered workshops, supported employment units and day activity centres for the disabled, day care centres, multi-service centres and social centres for the elderly, early education and training centres and special child care centres for disabled children, activity centres for discharged mental patients and social and recreational centres for disabled persons shall be opened and when they shall be closed. Similarly, EDB must decide and advise ISD whether kindergartens, schools for physically handicapped children and schools for mentally handicapped children shall be opened and when they shall be closed.

In order to spread the demand for public transport services on the issuance of the **No. 8 Signal**, HKO will issue via ISD two **Advisory Messages** explaining to the public what action should be taken.

The first **Advisory Message** (sample at **Appendix A to Annex A**) will be issued once the **No. 8 Signal** is

expected within two hours. The following action will be taken by EDB, SWD and HAD upon receipt of such notification by ISD:

- EDB should monitor the situation and issue press release on school arrangements as appropriate.
- SWD should activate emergency relief co-ordination centres, and decide whether and when day nurseries, day crèches, sheltered workshops, supported employment units and day activity centres for the disabled, day care centres, multi-service centres and social centres for the elderly, early education and training centres and special child care centres for disabled children, activity centres for discharged mental patients and social and recreational centres for disabled persons are to be closed, and should advise ISD accordingly.
- HAD will ensure that its public enquiry service will be in operation and liaise with the Policy and GLD Land Transport Division to prepare for any large-scale evacuation of people affected to temporary shelters.
- CAS will activate the CAS Central Command Centre and make manpower and resources readily available to assist the emergency services.
- HKO will advise SBDO of the need to issue warnings. ISD will advise the SBDO that the warnings are being issued, whether SWD facilities and/or schools are to be closed and of any other relevant information. The SBDO will arrange to activate the EMSC.

The second Advisory Message (sample at Appendix B to Annex A) will be issued once a No. 8 Signal has been issued. This message will be suitably modified if the Black Rainstorm Warning Signal is in force at the same time.

All subsequent messages relating to the tropical cyclone will also be disseminated by ISD and other parties on the advice of the HKO.

When any of the **No. 8, No. 9 or No. 10 Signals** are issued, **Tropical Cyclone Warning Bulletins** will be broadcast at 15-minute intervals. Appropriate **Precautionary Announcements** will accompany these

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bulletins (samples at **Appendices C and D to Annex A**). The latter message will be suitably modified if the **Black Rainstorm Warning Signal** is in force at the same time.

### 2. Rainstorms - Warnings and Action to be taken

The Amber-Red-Black colour coded warning system is operated by the HKO to give warnings of heavy rain-

storms which may affect or are affecting Hong Kong. This **Rainstorm Warning System** operates at all times and may be issued alongside other severe weather warnings, including **Tropical Cyclone Warning Signals**. A description of the **Rainstorm Warning System** is at **Annex B**.

During a potentially rainy day, the HKO will continuously assess the likelihood of significant rain so as to decide on the need to raise a rainstorm warning signal.

**Table A-2. The action to be taken in response to each signal**

Status	Condition	Purpose	Action required
Amber	Heavy rain has fallen or is expected to fall generally over Hong Kong, exceeding 30 millimetres in an hour, and is likely to continue	Alert public to potential heavy rain that may develop into Red or Black signal situations; trigger for Departments to be on the alert	(i) HKO will issue a Rainstorm Warning Signal Message and Amber Rainstorm Warning Signal Special Announcement via ISD to Government Departments and the media (samples at Appendices A and B to Annex B) (ii) Key liaison and emergency personnel in Departments should be on the alert and be geared up.
Red	Heavy rain has fallen or is expected to fall generally over Hong Kong, exceeding 50 millimetres in an hour, and is likely to continue	Action trigger to initiate pre-assigned sequence of action to combat rainstorms; warn the public of heavy rain and those who have to travel should carefully consider weather and road conditions	(i) HKO will issue a Rainstorm Warning Signal Message and Red Rainstorm Warning Signal Special Announcement via ISD to Government Departments and the media. (ii) Emergency units of non-Government organisations and Government Departments should take the necessary action stated under sections 6(I) and (II) respectively. - (iii) SBDO/ESU will closely observe the development and seek a direction on the need to activate EMSC.
Black	Heavy rain has fallen or is expected to fall generally over Hong Kong, exceeding 70 millimetres in an hour, and is likely to continue	Action trigger to advise the public to stay indoors, seek shelter or take other precautionary measures.	(i) HKO will issue a Rainstorm Warning Signal Message and Black Rainstorm Warning Signal Special Announcement via ISD to Government Departments and the media. (ii) Emergency units of non-Government organisations and Government Departments should take the necessary action stated under sections 6(I) and (II) respectively (iii) EMSC will be activated if it is not already operating.

HKO will inform EDB, ISD, PHQCCC, FSCC, SBDO/EMSC, TD, MD, CEDD, DSD, GFS and PCCW-HKT of the **Rainstorm Warning** to be issued. These organisations will immediately alert all other organisations in the manner set out at **Annex E**. EDB will decide whether schools will open or should be closed and will inform ISD to issue an appropriate public announcement. SWD will also be informed by ISD and will advise ISD whether or not to issue an announcement on the closure of day nurseries, day crèches, sheltered workshops, supported employment unit and day activity centres for the disabled, day care centres, multi-service centres and social centres for the elderly, early education and training centres and special child care centres for disabled children, activity centres for discharged mental patients and social and recreational centres for disabled persons.

ISD will liaise with the media to ensure that **Amber/Red/Black Rainstorm Warning Signal** messages are disseminated quickly and as a priority. In a similar manner to those used by television stations for Tropical Cyclones, Amber, Red or Black Rain Clouds will be displayed in the corner of television screens when in force.

From time to time, special announcements on precautionary measures, weather situation and rainstorm status will be issued by HKO via ISD to all Government Departments and the media (samples at **Appendix B to Annex B**).

The **Black Rainstorm Warning Signal** will be in force until the weather situation improves significantly, when the HKO may, in consultation with SBDO/EMSC and taking into account the general road conditions, consider it appropriate to cancel or change the warning. Having made this decision, the HKO will disseminate via ISD to Government Departments and the media an appropriate Rainstorm Warning Signal Message (samples at **Appendix A to Annex B**).

The **Red Rainstorm Warning Signal** will be in force until the weather situation improves significantly, when the HKO may, in consultation with SBDO/EMSC and taking into account the general road conditions, consider it appropriate to cancel the warning message. The HKO will disseminate via ISD to Government Departments and the media an appropriate Rainstorm Warning Signal Message (samples at **Appendix A to Annex B**).

HKO will endeavour to give prior indications of the downgrading of **Black or Red Rainstorm Warning Signal**. The message will be included in the relevant special announcement (sample in **Appendix B to Annex B**).

The dissemination of warning messages will be made initially by telephone calls, which will be followed by messages via telecommunications links or multi-fax services.

The prescribed rainfall levels for the issuance of the Rainstorm Warning Signals are for guidance only. When prolonged rain occurs, the Rainstorm Warning Signals may be issued even if these hourly rainfall levels are not reached.

HKO will try its best to issue the Amber Rainstorm Warning Signal a couple of hours ahead of anticipated heavy rain. However, this lead time may be considerably shorter in case heavy rain develops rapidly. Not all Amber signals will be followed by Red. For the Red and Black Rainstorm Warning Signals, HKO will endeavour to issue them before the prescribed rainfall levels are reached. However, as local severe rainstorms are extremely difficult to forecast and may develop very quickly, the lead time will generally be very short. There will even be situations in which a Red is issued without a preceding Amber. Similarly, a Black may be issued without a preceding Red.

As with any warning system containing a forecast element, the issuance of Rainstorm Warning Sig-



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nals will inevitably involve 'false alarms' and 'misses'. 'False alarms' mean that, after the issuance of Rainstorm Warning Signals, the actual rainfall fails to reach the specified levels. In the case of 'misses', Rainstorm Warning Signals are issued after the specified levels have been reached, due to rapid development of heavy rain. These 'miss' situations may even occur in inconvenient hours. Departmental operational procedures should therefore contain prescribed arrangements to cover such contingencies.

When both the ***Rainstorm Warning Signals*** and tropical cyclone warning signals No. 8, 9 or 10 are in force at the same time, paragraphs 3.1.5 to 3.1.7 above and **Appendices B to D of Annex A** regarding the announcements to be made should also apply.

### 3. Flooding - Warning and Action to be taken Flooding

It should be aware that when the Amber Rainstorm Warning Signal is issued, it implies that there will be flooding in some low-lying and poorly drained areas. The Red and Black Rainstorm Warning Signals indicate more serious flooding which could cause major disruption.

**A *Special Announcement on Flooding in the northern New Territories*** will be issued by the HKO whenever heavy rain affects the area and flooding is expected to occur or is occurring in the low-lying plains of northern New Territories which covers the North and Yuen Long Districts. It will be cancelled when the rainfall is no longer expected to cause further flooding. However, in areas where drainage is poor, flooding may persist for a long time after the end of a period of heavy rain and the cancellation of the announcement. Once issued, the announcement will be sent to Government Bureaux/Departments/Offices listed in Annex E2 and E4, the local radio and television stations for broadcast to the public. The announcement will be updated at

appropriate intervals until heavy rain is no longer expected to cause any additional significant local effects.

DSD has installed 21 River Stage Gauges covering flood prone areas in northern and north-western New Territories. When any river stage exceeds its alert level, DSD will alert FSD, HAD, the relevant HAD District Officer and SBDO/EMSC.

When a Special Announcement on Flooding in the northern New Territories is issued, the DSD Mainland North Region Emergency Control Centre will be activated. DSD and contractor staff will stand ready to clear blocked drains and watercourses in northern and north-western New Territories. FSD, HKPF, GFS and CAS will make available rescue and ambulance resources for providing evacuation and rescue services for flood victims, emergency treatment to casualties and their conveyance to hospitals. These resources will be strategically deployed in the flood prone areas having regard to the DSD flood alert, if issued. The Emergency Duty Officers of North and Yuen Long District Offices should liaise closely with FSD and DSD.

Upon receipt of a notice of a DSD flood alert or a report of flooding, staff of the District Office concerned will attend the site for obtaining a better understanding of the situation and contacting village representatives of low-lying areas to give warning. The village representatives will in turn alert their villagers who will also inform the District Offices concerned in case of flooding.

In the event that severe flooding is likely or is occurring in a particular district, the relevant District Emergency Co-ordination Centre (DECC) should be activated and the SBDO should be notified of the situation. As flooding is more likely after a prolonged period of heavy rainfall, District Officers concerned should take into account local situations and

weather conditions before deciding to step down any emergency response, even after the cancellation of Tropical Cyclone warning signals, Red/Black Rainstorm Warning or Special Announcement on Flooding in the northern New Territories.

The issuance of the announcement does not necessarily mean that the whole northern New Territories will generally be affected by heavy rain thus causing flooding in all low-lying plains. Heavy rain may be localised and leads to flooding in certain areas only. It is therefore inappropriate for closures of all schools in the northern New Territories to be declared automatically upon issuance of the announcement. In view of this unique circumstance, EDB is responsible, before the rainy season, for advising individual schools in the northern New Territories to consider and work out school closure arrangements, based on past experience on flooding and in consultation with DSD.

The Shenzhen Authority has agreed to give pre-warning to Hong Kong when water discharge from Shenzhen Reservoir is being considered. As far as possible, the decision on water discharge will be passed to Hong Kong 3 hours before the discharge. In the event of unforeseen circumstances where the 3-hour prior notice is not feasible, the Shenzhen Authority will notify Hong Kong as soon as possible. The Shenzhen Authority will pass the information to the Border Liaison Officer (BLO) of HKPF. Upon receipt of such notification, the BLO will immediately pass the message to the North and Yuen Long District Offices and the PHQCCC which will inform the emergency units of DSD, FSD, WSD, and HKO and SBDO/EMSC as well as ISD. A standard and factual press release will then be issued by ISD. Once the official communication between BLOs of the two sides has been established, subsequent exchange of information between technical departments can be made. Hong Kong will also be informed when the water discharge ceases.

## 4. Other Natural Hazards

### 4.1. Warnings and Action to be taken

Given the hazards posed by Hong Kong's tropical weather it is necessary to provide separate warnings for **Landslips, Thunderstorms and Tsunami**, in addition to those for Tropical Cyclones, Rainstorms and Floods. Detailed background information on Landslips, Floods and Thunderstorms is given in **Annex C**. As for tsunami, which is a geophysical hazard, detailed background information is given in **Annex D**.

**Landslip Warning** - Heavy rain can cause landslips. A Landslip Warning will be issued by the HKO in conjunction with the Geotechnical Engineering Office (GEO) when there is a high risk of many landslips as a result of persistent heavy rainfall. When a warning is issued, a **Landslip Special Announcement** on precautionary measures will be sent to the local radio and television stations for broadcast to the public. The announcement will be updated at appropriate intervals until the likelihood of landslips has diminished. When the Landslip Warning criteria is no longer met, the HKO will cancel the Landslip Warning in conjunction with the GEO.

**Thunderstorm Warning** - Whenever thunderstorms are expected to affect Hong Kong in the short term (within one to a few hours), a brief **Thunderstorm Warning Announcement** will be issued. Thunderstorm warnings are issued irrespective of whether thunderstorms are widespread or isolated. If thunderstorms will affect isolated areas within a short period of time, the thunderstorm warning issued by the HKO will indicate the areas being affected, to alert members of the public to take appropriate precautions. When thunderstorms are widespread or the areas being affected vary, it will be mentioned in the thunderstorm warning that Hong Kong will be affected by thunderstorms without specific reference to individual areas. Reports of high gust, hail, tornado and waterspout as well as special precau-

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tionary announcements will be included in the Thunderstorm Warning when situation warrants. **Thunderstorm Warnings** are primarily targeted at departments and organisations (including the construction, electric power and other industries; those outdoors; those at swimming pools and beaches; and those at sea) which have specific action to take to minimise loss or damage caused by lightning. The warning is also broadcast to alert the public to the potential threat of lightning. Advice on precautionary actions to be taken by individuals is given in publicity leaflets distributed by the HKO.

**Tsunami Warning** - If a severe earthquake in the South China Sea or the Pacific Ocean is expected to generate a significant tsunami in Hong Kong (i.e. a tsunami with a height of 0.5 metre or more above the normal tide level) and the estimated time of arrival (ETA) of the tsunami at Hong Kong is within 3 hours, the HKO will issue a **Tsunami Warning** (sample at **Appendix A to Annex D**) to alert members of the public to take precautions (sample precautionary announcements at **Appendix B to Annex D**). If a tsunami may reach Hong Kong but the tsunami height at Hong Kong is not likely to be significant, or a significant tsunami is expected to arrive at Hong Kong but the ETA of the tsunami is more than 3 hours away, then HKO will issue a **Tsunami Information Bulletin** (sample at **Appendix C to Annex D**) to notify members of the public. Tsunami Warnings are updated at hourly intervals until a final warning is issued indicating that the tsunami would not reach Hong Kong or has passed Hong Kong. **Tsunami Information Bulletins** are updated once every 6 hours when the time is more than 6 hours before ETA, and once every hour when the time is 6 hours or less before ETA, until the **Tsunami Information Bulletin** is replaced by a **Tsunami Warning** or a final bulletin. HKO will inform EDB, FSCC, ISD, OFTA, SBDO/EMSC, TD, CEDD, DSD, GFS, MD, PHQCCC, AAHK and PCCW-HKT of the issuance of the **Tsunami Warning** or the **Tsunami Information Bulletin**. These organisations

will immediately alert all other parties according to the alerting system set out in **Annex E**

### 5. Other general Warning

**Public and Media** - The rainy season in Hong Kong extends from April through to September. Hence, at the beginning of April each year, a general warning of the risks of prolonged heavy rain will be issued to the public and media by HKO in consultation with ISD.

**Shipping Industry** - Prior to the start of the typhoon season (May - November), a notice will be issued by MD to all local ship owners and agents.

**Squatter Areas and Floating Population** - Before 1 April each year, after which time heavy rains and landslip can be expected, HAD District Office staff will explain the dangers of heavy and prolonged rainfall during routine visits to squatter areas and typhoon shelters and will distribute leaflets containing the names and addresses of local temporary shelters.

## Response Recovery and Restoration

### 1. Phase I : Rescue

The objectives of this phase are the rescue of life, protection of property and containment of the situation/incident to prevent any further deterioration.

In the event of a disaster, it will be necessary to exercise strict control over access to the disaster site in order to ensure that the emergency services are not deflected from their task of saving lives, protecting property and safeguarding the disaster site for subsequent expert investigation. This control will apply to both members of the Civil Service and the public.



A disaster site normally consists of 2 zones, namely, the inner cordoned zone and the outer cordoned zone, both of which will be established by the Police. The Police will consult FSD as necessary on the establishment of the inner cordoned zone.

The Senior Fire Officer attending a disaster site will be the Rescue Commander and he will direct all rescue activity within the inner cordoned zone.

The Senior Police Officer attending a disaster site will be designated as the Police Field Commander. Each agency will command their own staff in the discharge of their duties, but the Police, in liaison with the Rescue Commander and the relevant HAD District Officer, will be the overall co-ordinator of the activities of all agencies at the scene.

The Rescue Commander will establish a Fire Services Command Post which will normally be a Mobile Command Unit with green strobe light. He will inform FSCC immediately of the time of the setting up and the location of this post. FSCC will then inform the SBDO or EMSC accordingly.

Representatives of other emergency services wishing to enter the inner cordoned zone of the disaster site will require Fire Services permission. If need be, Fire Services will issue safety helmets to essential personnel for working within the inner cordoned zone.

The Police will secure the outer cordoned zone surrounding the disaster site, and representatives of other departments wishing to enter it will require Police permission. If need be, Police will issue conspicuous vests or armbands to essential personnel for working within the outer cordoned zone.

The Police will establish a Field Command Post (FCP) at the scene. All police action at the scene shall be directed from the FCP. Likewise, the co-ordination of all other agencies operating at the disaster site shall be managed by Police from the FCP.

SBDO or EMSC will be notified of the establishment and location of the FCP.

Close liaison between the Police Field Commander, the Fire Services Rescue Commander and the relevant HAD District Officer will be necessary, as will coordination of the work of other agencies and handling of media & public enquiries. If the demand for emergency medical services exceeds the normal capacity of the single nearest receiving hospital then a Medical Control Officer of Hospital Authority, who is a senior accident and emergency physician, will be sent to the site to command and control the overall medical response. A Medical Team will also be despatched to the scene of incident upon request.

## 2. Phase II : Recovery

The objective of this phase is to return the community to a condition considered acceptable by the community.

The Police will assume overall responsibility for the disaster site, subject to HAD's role as Government spokesman and relief co-ordinator, and also subject to the discharge of any duties or responsibilities vested in any Government Department or agency by law or agreement. They will then take follow up action including the collection of human bodies and remains, the identification of fatalities and the recovery and safe custody of unattended property.

There will normally be an investigative commitment concerning death, injury or damage to property. This responsibility calls for the preservation of evidence and the location of witnesses.

HAD District Officer will co-ordinate relief measures by Social Welfare Department, Housing Department, and other bodies if necessary, at the scene with the support of his/her District Emergency Co-ordination Centre (DECC).

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ISD & HAD officers should liaise closely on site and discuss with other relevant departments to determine the best on-site press release strategy to deal with media & public enquiries.

### 3. Phase III : Restoration

The objective of this phase is to restore the community to the state prior to the disaster.

The disaster site should be released as soon as possible but this cannot be done until investigation and other on-site activities have been completed. The Police will not vacate the site until it has been properly handed over to the owner, occupier or a responsible Government Department.

This Phase may take some time because of the need to establish the ownership of property, and return it to the legal claimant.

### 4. Off site - Departmental District, Regional and Headquarters Co-ordination Centres

These centres should provide support to their on-site staff, proactively liaise and work with other centres within their own and other departments, and keep each other informed of the latest progress as necessary. Departments should also proactively liaise and work with SBDO/EMSC through their Headquarters Co-ordination Centres.

### 5. Emergency Monitoring & Support Centre (EMSC)

EMSC will be activated if a ***Tropical Cyclone Warning Signal No. 8 or higher***, a ***Black Rainstorm Warning Signal***, or a ***Tsunami Warning*** is issued.

EMSC may also be activated if a major natural disaster

has taken place or other potentially dangerous or disruptive severe weather condition is likely. In such events, HKO will inform SB through the SBDO. A decision as to whether to open EMSC will be made by the Secretary for Security, the Permanent Secretary for Security or the Deputy Secretary for Security(2).

Following a decision to activate EMSC, the SBDO will inform the Emergency Support Unit (ESU) of the decision and contact the first rostered EMSC team members who will immediately return to the Government Secretariat basement to man the centre. The Controller of EMSC will inform ISD, HAD, Police, FSD, GFS, HKO, TD, HA, Lands D, DEVB and EDB when the centre is activated.

The ISD Liaison Officer will report to EMSC to establish a two-way link with ISD's Combined Information Centre to feed information on the disaster situation and media and public concerns to EMSC; and to facilitate the issue of press releases, warnings and advice to the public via the media by EMSC. ISD will also relay to EMSC any information on restrictions on transport and other important public messages. The Police and FS Liaison Officers will report to EMSC to establish links with PHQCCC and FS CC respectively and keep EMSC informed of the incidents. The Police Liaison Officer will man the ECACCS terminal and draw important information to the EMSC Controller's attention. The DEVB(Works Branch) Liaison Officer will report to EMSC to liaise with DSD, CEDD, HyD, WSD and other works departments, and will interpret their reports. Other departmental Liaison Officers may be required to report to EMSC depending on the circumstances.

The HKO will contact the SBDO, or EMSC if activated, at hourly intervals (more frequently if the situation warrants) to advise on the weather conditions, including for example the progress of a tropical cyclone and an indication of the likelihood that a ***No. 8 Signal*** will be issued imminently.

On activation, EMSC will immediately establish links with HKO, ISD, HAD HQ, PHQCCC, FSCC, GFS, CEDD, DSD, HyD, DEVB, TD, Lands D, MD, HA, EDB, SWD and other relevant parties.

**The EMSC Controller on duty will be responsible for** - liaising generally with departments mentioned in paragraph 4.5.4 above (and others if necessary) through their coordination centres/emergency control centres in order to obtain and collate information on the overall situation as it develops. (Note: Departments which need to liaise and work directly with others should do so directly as far as possible, only involving EMSC in this process when necessary. Nevertheless, departments should be proactive in keeping EMSC and other departments fully informed in a timely and co-ordinated manner of the relevant information of any major incidents and what action is being taken. This should be done through regular situation reports (SITREPS) distributed by appropriate means of communication, e.g. facsimile and Bulletin Board System of EMSC, hourly, or at appropriate intervals as directed by the Controller, EMSC. These regular reports should be supplemented by special telephone and facsimile reports of important or urgent incidents and information);

providing a permanent link with the S for S through which urgent decisions on policy matters, difficult problems and emergency powers can be readily obtained by the departments concerned, together with clarification and guidance on the content or implementation of directives;

briefing senior Government officers on the situation;

acting as a link through which urgent public messages or announcements could be disseminated from the Government Secretariat via ISD for publication or broadcast;

obtaining and issuing policy directives on behalf of the Chief Executive's Security Committee (CESC), the Chief Secretary for Administration (CS) and the S for S;

advising CESC in the event that emergency legislation needs to be enacted to deal with the situation;

co-ordinating the acquisition and mobilisation of civil resources and those of outside bodies if necessary. (Fire Services and Police resources will be acquired and mobilised by their respective Commanders in liaison with FSCC and PHQCCC. This will also be the case for other departments);

co-ordinating disciplined services, civil and military operations and resolving problems as necessary in situations which exceed the resources available to individual departments; and

performing any other duties set out in the EMSC Operational Instructions, contingency plans or as may be required by CESC, CS and/or S for S.

Departments including, HyD, FEHD, LCSD, Lands D and BD, will coordinate and carry out the clearance of road blockages to enable early resumption of normal traffic after typhoon or tsunami. When there are very significant damage brought to roadside trees and structures, and hence causing a large number of road blockages, departments may refer to the priority list of important public roads prepared by TD in setting priority on clearance of fallen trees from different sources. To speed up the resumption of public transport services, a designated officer from TD will also attend EMSC to help collate/update public transport information. HyD, FEHD, LCSD, Lands D and BD will each set up a single focal point of contact for direct and regular liaison with EMSC, the Emergency Transport Coordination Centre (ETCC) of TD or with relevant departments, as appropriate. Nevertheless, it should be noted that EMSC is not the command or coordina-

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tion centre for the department's work and its role is primarily to monitor and provide necessary support to the departments' operation if necessary. The responsibility for clearing road blockages continues to rest with HyD, FEHD, LCSD, Lands D and BD. In respect of coordinating the resumption of the public transport services, the responsibility continues to rest with TD. Hence, in normal circumstances, the departments will continue to establish the necessary coordination amongst them. Priority lists of important public roads maintained by TD will be kept at coordination centres of relevant departments to facilitate the clearance of road blockage.

## Training and Capacity Building

### 1. Departmental Training Programmes

A Departmental Training Officer must be designated by each department involved in the Contingency Plan. He must be familiar with the contents of his own department's plan on the subject, and must ensure that the plan is included in the overall training programme of the department.

Training courses should be given as early as possible to all new staff who will be involved in the Contingency Plan, whilst refresher courses should be organised for existing staff on a regular basis.

As the correct initial responses are of paramount importance to the success of the Contingency Plan, officers of the departments below must be thoroughly trained on their roles in dealing with emergency situations arising from natural disasters.

***Education Bureau***

***Development Bureau***

***Security Bureau***

***Departments in the Transport and Housing Bureau***

***Fire Services Department***

***Home Affairs Department***

***Hong Kong Observatory***

***Hong Kong Police Force***

***Information Services Department***

***Transport Department***

***Works Departments in the Development Bureau***

### 2. Testing of the Plan

The adequacy and effectiveness of the Contingency Plan should be fully tested on a regular basis. Suitable scenarios involving natural disasters should also be included in the Government's Command Post Exercises.

### 3. Operational Drills

Annually, all emergency organisations should test their operational procedures and conduct drills for those of their sections that are involved in the Contingency Plan.

## Responsibilities of Government Bureaux and Departments and Non-government Organizations

### 1. Government Bureaux's and Departments' Responsibilities

During an emergency, Government departments have a general responsibility for carrying out their normal functions as far as possible. Some departments have specific operational and reporting duties in an emergency. In this regard, detailed departmental operational orders/instructions are issued by those departments to the staff concerned.

It is important that departments concerned should keep SBDO/EMSC and ISD informed in a timely and coordinated manner of the development of all rescue/emergency operations and other important events and information so that the latter can fully discharge their respective responsibilities.

Staff who are not specifically required for duty may, at the discretion of Heads of Department, be allowed to return home before or upon the issuance of a Tropical Cyclone Warning Signal No. 8 and possibly also under certain other severe weather conditions, depending on the journey to be undertaken and the likelihood of certain transport services being suspended. General guidelines for the release of Government staff in the event of severe weather conditions have been issued by Civil Service Bureau.

The responsibilities of the relevant departments are summarised in the following paragraphs.

**Agriculture, Fisheries and Conservation Department (AFCD)** - The Director of Agriculture, Fisheries and Conservation will be responsible for the operation of the AFCD departmental Emergency Headquarters once a Tropical Cyclone Warning Signal No. 8 or higher or a Tsunami Warning is issued in order to collate reports of loss and damage and to direct emergency measures. When a Red or Black Rainstorm Warning Signal or a Landslip Warning is issued, this Emergency Headquarters may be activated as directed by the Director of Agriculture, Fisheries and Conservation. The Department is responsible for the clearance of trees (except those under the authority of FEHD and LCSD as mentioned in paras. 6.4.14 and 6.4.26 respectively) which block roads or become dangerous during natural disasters. The Department is also responsible for assessing the extent of loss or damage to agriculture and fishery undertakings, reporting this to the ISD Duty Officer, and taking necessary relief measures.

**Architectural Services Department (ArchSD)** - The Director of Architectural Services will be responsible for advising on the stability of damaged government buildings and for carrying out the necessary emergency repairs.

**Auxiliary Medical Service (AMS)** - The Chief Staff Officer, AMS, will be responsible for providing volunteers to give medical assistance to augment the services of the Hospital Authority and Department of Health and Fire Services Department's ambulance services in a natural disaster. When a Tropical Cyclone Warning Signal No. 8 or higher or a Tsunami Warning is issued, contingents of AMS personnel will be deployed to ambulance depots to reinforce regular ambulance personnel as appropriate. When a Red/Black Rainstorm Warning Signal, a Special Announcement on Flooding in the northern New Territories or a Landslip Warning is issued, the AMS Emergency Duty Team will also be alerted for deployment as and when requested by the Fire Services Department.

**Buildings Department (BD)** - The Director of Buildings will be responsible for the setting-up and operation of an emergency organisation to deal with reports concerning damaged private buildings, building works, landslips and slopes which threaten these buildings.

**Civil Aid Service (CAS)** - The Chief Staff Officer, CAS, will be responsible for deploying trained and disciplined volunteers to assist in operations such as search and rescue, crowd control, registration of victims, casualty handling, evacuation and feeding of disaster victims, clearance of roadways blocked by fallen trees or landslip. During an emergency, CAS personnel may be called in and deployed as required in all parts of the Territory.

**Civil Aviation Department (CAD)** - The Director-General of Civil Aviation will be responsible for broadcasting the latest meteorological information to all aircraft operating in the Hong Kong Flight Information Region. In close consultation with the HKO, he will consider restricting air traffic movements. The Director-General will also take a leading role in dealing with any aircraft accidents, air crashes and aircraft salvage operations as detailed in the relevant Security Bureau Circulars.

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Civil Engineering and Development Department (CEDD) - Head of the Geotechnical Engineering Office (GEO), CEDD will be responsible for deciding in consultation with the HKO when a Landslip Warning should be issued or cancelled; for advising Government departments on potential dangers due to landslips and rockfall incidents and on measures to deal with them; for providing advice and arranging for the supply of explosives for clearance work involving rocks, dangerous boulders and other occurrences where the use of explosive is required, and for answering requests for assistance in the saving of life, protection of property, and miscellaneous calls for action or assistance within the resources of his Department. The Head of the Civil Engineering Office (CEO), CEDD will be responsible for advising on the stability of damaged marine facilities and organising necessary emergency repairs.

Drainage Services Department (DSD) - The Director of Drainage Services is responsible for clearing and repairing blocked or damaged sewers and storm-drains, including engineered sections of open channels, major stream courses and for ensuring the satisfactory operation of sewage treatment works and floodwater pumping stations. The Department will normally set up an Emergency Control Centre (ECC) upon the issue of a Tropical Cyclone Warning Signal No. 8 or higher, a Red/ Black Rainstorm Warning Signal, or a Tsunami Warning or when circumstances so warrant. The ECC acts as DSD's channel of communication with DEVB and other departments and also as a link with EMSC. The Mainland North Region Emergency Control Centre will also be set up upon the issue of Special Announcement on Flooding in the northern New Territories or upon receipt of notification of water discharge from Shenzhen Reservoir.

Education Bureau (EDB) - The Secretary for Education and Manpower will decide whether and if so, at what time schools and kindergartens will be

closed, in consultation with the HKO, ISD, DSD and Regional Command & Control Centres of HKPF on the weather, road and traffic situations.

Electrical and Mechanical Services Department (EMSD) - In close liaison with the utilities companies, the Director of Electrical and Mechanical Services will be responsible for ensuring that, in the event of electricity and town gas supplies being interrupted during severe weather conditions, these companies will, as quickly as practicable, carry out repair works to resume supply. Upon request, the Department will also provide special equipment to assist with search and rescue operations.

Fire Services Department (FSD) - The Director of Fire Services will be responsible for extinguishing fires, protecting life and property in case of fire or other calamity and emergency rescue work, which includes rendering assistance to people who appear in need of immediate medical attention and conveying them to hospital. The Department will report incidents in which it is involved to the ISD Duty Officer, and pass on necessary information on natural disasters to the AMS and CAS.

Food and Environmental Hygiene Department (FEHD) - The Director of Food and Environmental Hygiene will be responsible for carrying out the following duties:

(a) under the direction of Police, the removal of dead bodies, and to assist the Director of Health to arrange for temporary mortuary facilities when required;

(b) supply of temporary toilets and dustbins, collection of refuse and maintenance of hygiene in temporary and relief centres;

(c) clearance of dangerous or fallen trees after cutting up by LCSD from public roads in the urban area not within recreation sites maintained by AFCD or LCSD and the access to them is not



restricted by drop gates.

(d) clearance of refuse from open/surface drains and choked gullies; and

(e) removal of animal carcasses.

Government Flying Service (GFS) - The Controller, GFS, will be responsible for providing whatever flying services may be required for life-saving, flying of relief supplies, aerial photography, surveillance, casualty evacuation and reconnaissance. All requests for helicopters should be made to the PHQCCC or FSCC.

Government Logistics Department (GLD) - The Director of Government Logistics will be responsible for supplying emergency items (e.g. blankets, sandbags, disinfectant) from its central warehouse at the Government Logistics Centre, and for arranging the urgent purchase of non-standard items. The Land Transport Division of GLD will be responsible for the provision of emergency transport support to deliver these items to user departments if departmental transport is unavailable. A control centre will be set up in the Hong Kong Transport Pool, within one hour from being notified, to co-ordinate the deployment of pool vehicles.

Health, Department of (DH) - The Director of Health will provide a physicist at a disaster site, if radioactive substances are involved. If required, the Director of Health, with assistance from Director of Food and Environmental Hygiene when necessary, will arrange for temporary mortuary facilities, and for the carrying out of autopsies.

Highways Department (HyD) - The Director of Highways will be responsible for clearing and repairing blocked or damaged public roads, removing dangerous and fallen boulders and dealing with landslips on unallocated Government land which has not been allocated to any department for maintenance, answering requests for assistance in the

saving of life, protection of property and miscellaneous calls for action or assistance within the resources of his Department, and for co-ordinating repairs to utilities during emergencies. The Department is also responsible for keeping TD informed of the progress in their road repair and clearing work at regular intervals to enable TD to co-ordinate and develop transport arrangements as necessary.

Home Affairs Department (HAD) - The Director of Home Affairs will be the "Disaster Relief Co-ordinator", working through the headquarters emergency control centre and the District Officers. The District Officers will co-ordinate disaster relief efforts at the local level, in co-operation with Social Welfare Department, Housing Department and others as necessary. District Officers of the HAD will be responsible for co-ordinating emergency relief work in their districts and for reporting to their headquarters on the local situation. Each District Office will set up a DECC to be manned around the clock when a Tropical Cyclone Warning Signal No. 8 or higher, a Red or Black Rainstorm Warning Signal, or a Landslip Warning is issued. When a Special Announcement on Flooding in the northern New Territories is issued, the District Officers of North and Yuen Long Districts should decide if the DECC should be activated having regard to prevailing local conditions. When a Tsunami Warning is issued, each District Office will activate the DECC. As soon as Tropical Cyclone Warning Signal No. 1 is issued, the Public Enquiry Hotline of HAD Headquarters will be manned 24 hours a day to answer public enquiries of a non-technical nature. When a Tropical Cyclone No. 8 Signal or higher, a Red or Black Rainstorm Warning Signal, a Landslip Warning or a Tsunami Warning is issued, staff of HAD Headquarters will open an Emergency Co-ordination Centre which will act as a channel of communication with the DECCs in District Offices and also as a link with the EMSC. This Centre is responsible for supplying the ISD with regular situation reports on conditions in the districts. HAD shall arrange for

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community centres/halls to be available to the people who are affected by natural disaster and required temporary shelters. HAD will also provide advice on matters affecting the residents of the district and co-ordinate the strategy for dealing with public enquiries on site. In the event of a major incident, the relevant District Office will make decision on the opening of a help desk which will be manned by HAD, HKPF, FSD, SWD and other organisations where appropriate.

**Hong Kong Observatory (HKO)** - Director of the Hong Kong Observatory will be responsible for originating all weather-related warnings, tsunami warnings, and general precautionary announcements to the public and for providing meteorological or tsunami-related advice to other departments/agencies.

**Hong Kong Police Force (HKPF)** - The Commissioner of Police will be responsible for the co-ordination of all agencies operating at the scene of the disaster during rescue, recovery and restoration phases until the site is handed over to its lawful owner(s) or other controlling authority. He will also be responsible for the preservation and security of the site during this time. He will control and direct traffic so as to restrict general access and facilitate emergency services' access to the site, and to facilitate unimpeded casualty evacuation. He will also collate and disseminate data on casualties arising from the disaster. If necessary in a major disaster, he will mobilise the Casualty Enquiry Unit at PHQCCC to facilitate this work and notify ISD and SBDO/EMSC of the contact telephone number. The Casualty Enquiry Unit will be supported by the Disaster Victim Identification Unit and Casualty Documentation Teams. Where there is evidence of a criminal offence or criminal negligence, or where directed by the Coroner or other competent authority, he will be responsible for conducting investigations into the facts. Within HKPF, PHQCCC is responsible for coordinating the overall Police response to any emergency and for liaison with

other Government Departments including SBDO/EMSC, HAD, ISD and TD, keeping them informed of traffic accidents and road conditions and other matters and handling their enquiries. The Police will also keep SBDO/EMSC, and where appropriate ISD, informed of casualties, missing persons and other relevant information. Meanwhile, the Police Public Relations Branch (PPRB) is responsible for informing the media of traffic accidents and road conditions and other matters and handling their enquiries.

**Hospital Authority (HA)** - The Chief Executive of the Hospital Authority will be responsible for providing emergency medical services during a natural disaster. These services will be coordinated by HA's Head Office Duty Officer (HODO). The HA Civil Disaster Control and Co-ordination Centre will be manned upon the issuance of a Black Rainstorm Warning Signal, a Tropical Cyclone Warning Signal No. 8 or higher, a Tsunami Warning or at the outbreak of a major disaster. If situation warrants, the HA will send a medical team and a Medical Control Officer to the site of incident involving a large number of victims at the request of FSD. The HA is also responsible for advising ISD and PHQCCC's Casualty Enquiry Unit, if mobilised, on the number and conditions of victims attended or admitted to its hospitals as a result of the above circumstances.

**Housing Department (HD)** - The Director of Housing, in conjunction with the relevant District Officer(s) of HAD and the Director of Social Welfare, will be responsible for providing emergency accommodation for victims made homeless by natural disasters. HD Departmental Communication Centre, which is a focal point of contact for the public and government departments during emergencies, is manned by Duty Officers outside working hours. The Department is also responsible for advising the ISD Duty Officer of damage to public housing, and of the number of people provided with emergency accommodation.



Information Services Department (ISD) - The Director of Information Services will co-ordinate overall public relations strategy as well as the Press Release strategy for handling media enquiries and be responsible for promptly issuing advisory warnings and related information to the SBDO/EMSC, PHQCCC, other government departments and the public via the media, on advice from HKO, Secretary for Development, Head of GEO, CEDD or EMSC. ISD will liaise, through its Combined Information Centre, with departments having key front-line roles in natural disasters and will issue special announcements and regular round-ups on disaster conditions to the SBDO/EMSC, PHQCCC, other government departments and the public via the media. ISD will also co-ordinate and advise the setting up of hotlines by the key responsible departments if situation warrants.

Lands Department (Lands D) - The Slope Maintenance Section of Lands D is responsible for emergency and urgent repair works to landslips occurring on man-made slopes on Unallocated Government Land Category 5(f). The District Lands Officers of the New Territories will be responsible to the DECCs of HAD NT District Office for locating areas affected by a Tropical Cyclone, Rainstorm, Flooding, Landslip or Tsunami, and for making first-hand ground situation reports to the DECCs at the district offices for further necessary action. They will then deal with applications for repairing/rebuilding of damaged structures covered by permits/licences. They will also assist in providing land status reports on the disaster area to relevant Government Departments having a duty to take follow-up action in the aftermath of the disaster. The Department's Survey and Mapping Office is responsible for providing existing mapping data and supplying aerial photography, in conjunction with GFS, of the disaster area. The Office will also conduct topographical surveys after the disaster if necessary.

Leisure and Cultural Services Department (LCSD) -

The Director of Leisure and Cultural Services will be responsible for providing staff, when required during an emergency, for the cutting up within the urban areas, and the cutting up and clearance within the New Territories of dangerous or fallen trees within their venue and from roadsides within 5 metres from the edge of a public road except those traversing Country Parks. Also see paragraph 4.5.8. When a Tsunami Warning is issued, LCSD will advise ISD whether to issue an announcement on the closure of beaches and suspension of water activities.

Marine Department (MD) - The Director of Marine will be responsible for liaising closely with shipping companies and freight terminal operators during severe weather conditions or a tsunami warning with a view to controlling and deciding whether to close the Port, and for co-ordinating assistance to any vessels found in distress through his Maritime Rescue Co-ordination Centre. The Department will keep the public, ISD and SBDO/EMSC informed of the running of and any disruption to ferry and other vessel services plying Hong Kong/Macao and Hong Kong/Mainland operated by respective companies. The Director will also take the leading role in dealing with any incidents in the harbour or out at sea.

Office of the Telecommunications Authority (OFTA) - The Director-General of Telecommunications will be responsible for promptly relaying the possible Telecommunications Network Congestion Warning to the telecommunications network operators upon receipt of a Tropical Cyclone Warning Signal No. 8 or above, a Red or Black Rainstorm Warning Signal, or a Tsunami Warning from HKO and will monitor any disruption to any of their services and effect quick repairs.

Security Bureau /Emergency Monitoring and Support Centre - SB monitors and supports Government's overall response to major emergencies including those arising from severe weather conditions and tsunamis. SB also provides the link and

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first point of contact between the rest of Government, and Chief Executive's Office (CE's Office) and the Chief Secretary for Administration through the SBDO/EMSC, S for S, PS for S or DS(S)2, depending on the circumstances. The S for S, PS for S or DS(S)2 will decide when CE's Office and CS need to be informed and will advise on how they may need to be involved. Communication with CE's Office or the CS on emergencies should be channelled through SBDO/EMSC. The EMSC will be activated and manned by staff of the Government Secretariat on instructions from the S for S, PS for S or DS(S)2 and whenever a Tropical Cyclone No. 8 Signal or higher, a Black Rainstorm Warning Signal, or a Tsunami Warning comes into effect. It may also be activated as a result of other severe weather conditions and/or emergency situations. Communications between EMSC and departments will normally be through the telephone system and the Bulletin Board System. The EMSC fallback telephone network will be used if there are problems with the telephone system.

**Social Welfare Department (SWD)** - The Director of Social Welfare, in conjunction with the relevant District Officer(s) of HAD and the Director of Housing, will be responsible for providing food, blankets and other emergency items when victims of a disaster are in need and when temporary shelters are open following the issue of a Tropical Cyclone Warning Signal No. 8 or higher, a Red or Black Rainstorm Warning Signal, a Landslip Warning, or a Tsunami Warning. The Department has three emergency relief duty teams in Hong Kong, Kowloon and the New Territories respectively, which can be deployed in an emergency. Each of these teams is headed by a Duty Officer (Emergency Relief) who can be contacted through PHQCCC, and who should comply with the Police's requests as far as possible. The Department is also responsible for advising SBDO/EMSC and the ISD Duty Officer of the relief measures which have been taken. The Director of Social Welfare will decide whether, and if so, at what time, day nurseries, day crèches, sheltered

workshops, supported employment units and day activity centres for the disabled, day care centres, multi-service centres and social centres for the elderly, early education and training centres and special child care centres for disabled children, activity centres for discharged mental patients and social and recreational centres for disabled persons will be closed. Based on the information provided by the HKO, ISD and Police Public Relations Branch on the weather and traffic situations, the Director will also advise parents and those taking care of the disabled and elderly not to take children, disabled and elderly to the centres in view of the severe weather conditions (though the centres will remain open as usual).

**Transport Department (TD)** - The Commissioner for Transport will be responsible for keeping in contact with the HKO, Police and HyD to get updates on the weather and road conditions to better co-ordinate public transport through close liaison with the respective transport operators and to develop traffic and transport contingency plans. If need be, Emergency Transport Co-ordination Centre (ETCC) will escalate its operation to Fixed Mode Tier 2 or Tier 3. The Department will keep SBDO/EMSC, Police, ISD and HyD fully informed of the details of public transport operations. The Department will also be responsible for alerting and liaising with public transport operators, tunnel and bridges operators and mitigating the effects of traffic and transport problems. Moreover, to facilitate the timely restoration of the public transport system after typhoon, the Department has issued "a list on important routes for road clearance operations after typhoon" to departments concerned for reference when undertaking road clearance work.

**Development Bureau (DEVB)** - The Secretary for Development shall provide a Liaison Officer to EMSC to be the DEVB (Works Branch) Liaison Officer. That officer will liaise with DSD, CEDD, HyD, WSD and other departments in the Transport and Housing Bureau, to interpret reports sent to EMSC, advise both EMSC and the departments of impor-

tant relevant developments and, should the situation warrant it, to co-ordinate the emergency/remedial roles of these departments.

## 2. Non-government Organizations' Responsibilities

The following organisations will be responsible for transmitting or broadcasting information about weather conditions, precautionary measures and so on to their customers, clients and members of the public on the advice of HKO or ISD. They should also inform ISD and the Office of the Telecommunications Authority (OFTA) of any disruption to any of their services and effect quick repairs: -

**ATV**

**Cable TV**

**Commercial Radio**

**Metro Radio**

**PCCW-HKT**

**Radio Television Hong Kong**

**TVB**

The following organisations will be responsible for keeping the MD fully informed of any disruption to their operations during severe weather conditions or a tsunami: -

**Asia Container Terminal Co Ltd**

**COSCO - HIT Terminals (HK) Ltd**

**CSX World Terminals Hong Kong Ltd**

**Hong Kong International Terminals Ltd**

**Hong Kong Pilots Associations Ltd**

**Hong Kong United Dockyards Ltd**

**Kowloon Wharf Terminal & Warehouse Ltd**

**Modern Terminals Ltd**

**River Trade Terminal Co Ltd**

The following organisations will be responsible for

advising the TD Duty Officer through its Emergency Transport Co-ordination Centre, and ISD of any likely disruptions to the provision of their public transport services due to severe weather conditions or a tsunami: -

**Discovery Bay Transportation Services Ltd**

**Hong Kong & Kowloon Ferry Ltd**

**New World First Ferry Services Ltd**

**PARK Island Transport Co Ltd**

**Star Ferry Co Ltd**

**Citybus Co Ltd**

**Discovery Bay Transit Services Ltd**

**Kowloon Motor Bus Co (1933) Ltd**

**Long Win Bus Co Ltd**

**New HK Bus Co Ltd**

**New Lantau Bus Co Ltd**

**New World First Bus Services Ltd**

**Hong Kong Tramways Co Ltd**

**Kowloon Canton Railway Corporation (East Rail including MOS Rail)**

**Kowloon Canton Railway Corporation (Light Rail)**

**Kowloon Canton Railway Corporation (West Rail)**

**MTR Corporation Ltd**

**Peak Tramways Co Ltd**

**Aberdeen Tunnel**

**Kai Tak Tunnel**

**Cross Harbour Tunnel**

**Discovery Bay Tunnel**

**Eastern Harbour Crossing**

**Lion Rock Tunnel**

**Shing Mun Tunnels**

**Tai Lam Tunnel**

**Tate's Cairn Tunnel**

**Tseung Kwan O Tunnel**

**Tsing Ma Control Area (Cheung Tsing Tunnel,**

**Tsing Ma Bridge and Ting Kau Bridge)**

## Disaster Management System

### ***Western Harbour Crossing***

The following organisations will be responsible for advising MD, and ISD of any likely disruption to the provision of their services due to severe weather conditions or a tsunami: -

***Companies Operating Ferries And Other Vessels  
Services Between Hong Kong and Mainland  
New World First Ferry Services Ltd  
Shun Tak-China Travel Ship Management Ltd***

The following organisations will be responsible for advising the AAHK, CAD and ISD of any likely disruptions to the provision of their services due to severe weather conditions:

### **Airline Companies**

The following companies will be responsible for informing EMSD, FSD and ISD of any disruption to services and for making safe and effecting prompt repairs to their supply lines and stations: -

***CLP Power Hong Kong Limited  
Hong Kong and China Gas Co Ltd  
Hong Kong Electric Co Ltd***

The following organisation will be responsible for informing all airline companies of the issuance of severe weather warnings/signals and keeping ISD, SBDO/EMSC and the Police in the Airport Emergency Centre of AAHK informed of the running of and any disruption to airline services: -

### ***Airport Authority Hong Kong***

## **Revision of the Plan**

Security Bureau will co-ordinate annual updating of the Contingency Plan in consultation with all

addressees. Revisions of the plan should also incorporate recommendations made as a result of reports on exercises for improvements in training, equipment, procedures and so on.

All bureaux, departments and other agencies are responsible for promptly notifying Security Bureau, as and when they occur, of any changes to the Contingency Plan that may be necessary as a result of reorganisations, changes in capabilities and available resources and other circumstances. SB will then issue suitable amendments to all addressees.

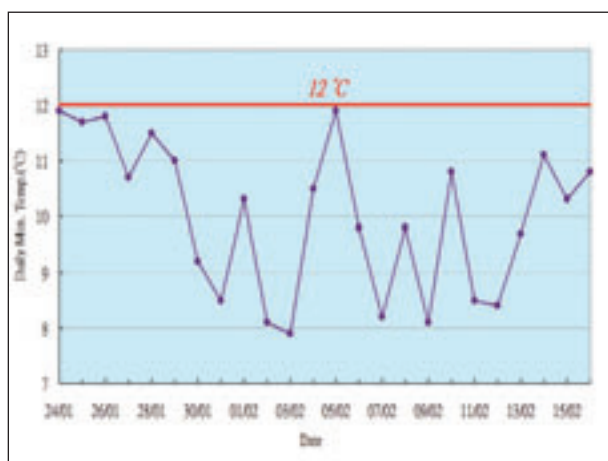
## **Severe Weather Events in Hong Kong in 2008**

### **1. Prolonged cold Spell in early 2008**

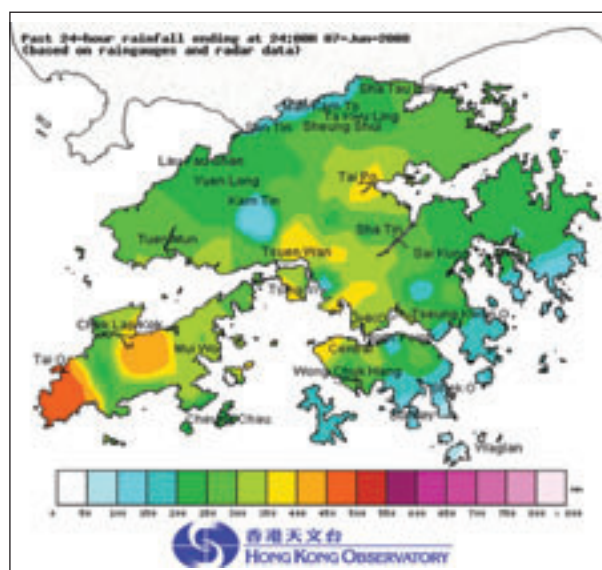
Under the influence of an intense northeast monsoon, cold and rainy weather persisted for 24 days from 24 January to 16 February in Hong Kong. The minimum temperatures recorded at the Hong Kong Observatory stayed below 12 degrees Celsius for 24 days consecutively. This is the longest cold spell in Hong Kong since 1968.

This exceptionally long cold spell was a result of the cold air from Siberia moving south to reach central and southern China incessantly, while moist air was transported from the South China Sea and even as far as the Indian Ocean. The rendezvous of the cold and moist air brought continuous cloudy, rainy and cold weather to the region.

During the period, over 33,000 calls for assistance from the elderly were received by the Senior Citizen Home Safety Association which is a non-governmental organization providing caring service to the elderly in Hong Kong. More than 2,600 of the callers were subsequently sent to hospital for further treatment.



**Figure A-1. Daily Minimum Temperature at Hong Kong Observatory from 24 Jan to 13 Feb 2008**



**Figure A-2. The distribution of daily rainfall in Hong Kong on 7 June 2008**

## 2. JUNE Heavy Rainstorm on 7 June

Under the influence of an active trough of low pressure, heavy rain and squally thunderstorms affected Hong Kong on 7 June 2008. Rain was heaviest in the morning. An hourly rainfall of 145.5 millimetres was recorded at the Headquarters of the Hong Kong Observatory during the hour from 8 to 9 a.m., the highest hourly rainfall on record. Over 200 millimetres of rainfall were recorded generally over Hong Kong on that day, with those at Lantau Island and urban areas exceeding 300 millimetres. The total daily rainfall recorded at the Headquarters of the Hong Kong Observatory was 307.1 millimetres, the 5th highest daily rainfall record in June.

During the heavy downpour on 7 June 2008, 89 landslips and 539 cases of flooding were reported, 2 people died and 24 people were injured. At the Hong Kong International Airport, 412 flights were delayed and 14 flights were cancelled.

## 3. Tropical Cyclones

As of 1 November 2008, six tropical cyclones came close to Hong Kong which necessitated the issuance of tropical cyclone warning signals in Hong Kong. These are described in the following sections.

### 3.1 Typhoon Neoguri

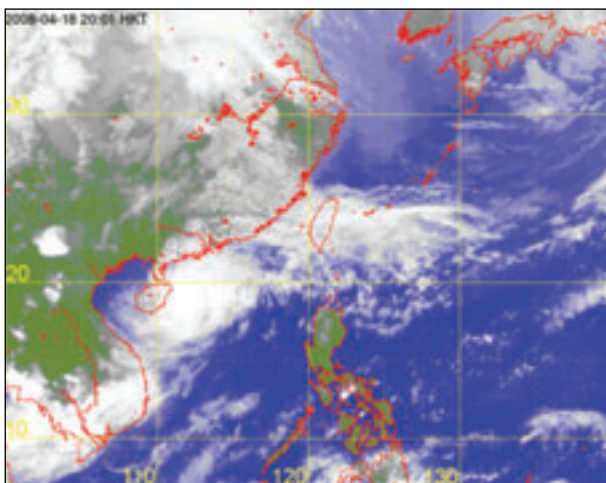
Neoguri formed as a tropical depression over the South China Sea about 360 km east of Nansha on 15 April. It moved generally west-northwestwards and intensified into a tropical storm that evening. Neoguri intensified into a severe tropical storm and turned onto a north-northwesterly track on the afternoon of 16 April. It intensified further into a typhoon that evening and turned to a northerly track on the evening of 18 April. After skirting the northeastern tip of Hainan on the early morning of 19 April, Neoguri weakened to a severe tropical storm and moved north-northeastwards. Under the combined effect of Typhoon Neoguri and the northeast monsoon, local winds started to pick up on 18 April. Local winds became generally strong in the



## Disaster Management System

afternoon of 19 April when Neoguri was about 200 kilometers to the west-southwest of Hong Kong. When Neoguri approached the coast of western Guangdong, the warm southerly winds associated with Neoguri met the relatively cooler northeast monsoon and formed a warm front with severe convective activities over the coastal waters of Guangdong. The warm front moved from south to north across the coast of Guangdong and brought heavy rain to Hong Kong on that day. The total daily rainfall recorded at the Hong Kong Observatory on that day was 237.4 millimetres, the highest daily rainfall amount recorded in April since record began.

During the passage of Neoguri, there were 157 reports of flooding, 13 reports of landslides and 70 reports of fallen trees. In Hung Hom, the iron-cover of a rooftop structure was blown off. In To Kwa Wan, a concrete window ledge was broken and fell to the street, but there were no injuries. At the Hong Kong International Airport, over 200 flights were delayed, around 30 flights were cancelled and 66 flights were diverted.



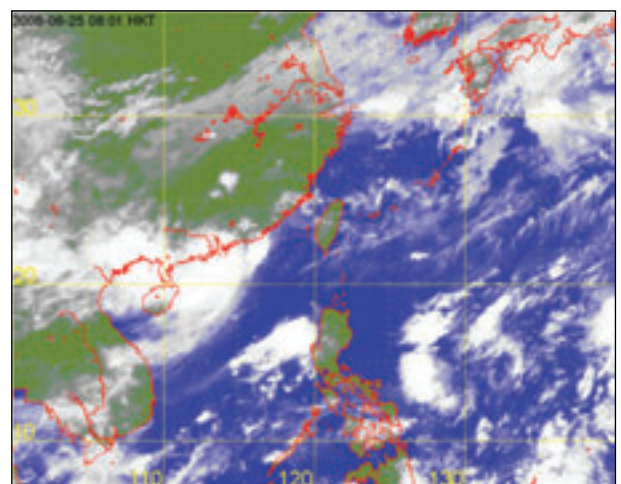
**Figure A-3. Satellite infra-red imagery of Neoguri at around 8 p.m. on 18 April 2008**

### 3.2 Typhoon Fengshen

Fengshen formed as a tropical depression over the western North Pacific about 1440 km east-south-

east of Manila on the evening of 18 June. It moved west-northwestwards and gradually intensified into a typhoon. Fengshen entered the South China Sea on the evening of 22 June and weakened into a severe tropical storm in the following afternoon. It turned to move north-northwestwards on 24 June towards the south China coast. With Fengshen approaching the coast of Guangdong on 24 June, the weather became showery and winds started to pick up in the evening. Fengshen passed to the east of Hong Kong and made landfall over eastern Shenzhen on the early morning of 25 June. Local winds were generally strong and occasionally up to gale force during the day. Fengshen also brought heavy downpour to the territory on that day.

Seventeen people were injured during the passage of Fengshen. There were 38 reports of flooding and 41 reports of fallen trees in various districts, 12 reports of landslides at Repulse Bay, Tuen Mun and Lantau and five reports of collapsed scaffoldings at Sheung Wan, Central, Tai Koo Shing and Kowloon Bay. A glass panel was blown off the outer wall of a shopping mall in Tsuen Wan, injuring three passers-by. Flood waters washed into the house of an elderly couple in Yuen Long but there were no casualties. At the Hong Kong International Airport, 135 inbound and 182 outbound flights were delayed, 26 flights were cancelled and one flight had to be diverted.

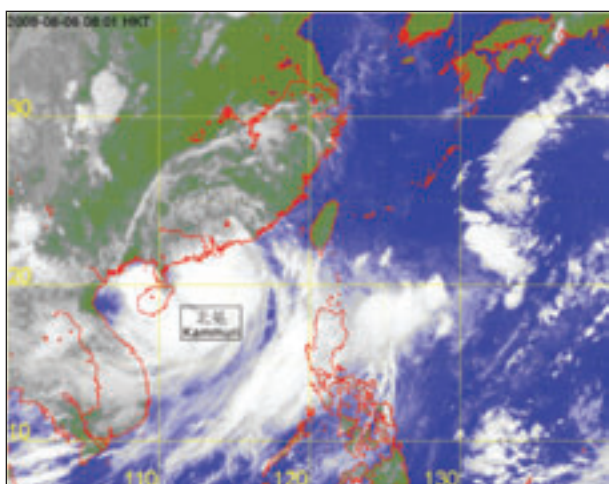


**Figure A-4. Satellite infra-red imagery of Fengshen at around 8 a.m. on 25 June 2008**

### 3.3 Severe Tropical Cyclone Kammuri

Severe Tropical Storm Kammuri formed over the northeastern part of the South China Sea on 4 August. With Kammuri edging west-northwestwards towards the coast of Guangdong, local weather started to deteriorate on the next day. Kammuri passed to the southwest of Hong Kong and made landfall over Yangxi County in western Guangdong on 6 August. Under the influence of Kammuri, the weather became windy and rainy on 6 August. Local winds generally reached strong to gale force and 74.1 millimetres of rainfall were recorded at the Hong Kong Observatory on that day. The remnant of Kammuri continued to bring rainy and thundery weather to the territory on 7 and 8 August.

At least 37 people were injured during the passage of Kammuri. There were over 40 reports of fallen trees and collapsed scaffoldings in various districts. There was also one report of landslides in Tai Hang. Two windows were blown off from a 70-storey office tower in Quarry Bay and damaged four flats of a nearby residential building. Over 10 people had to be evacuated in Kwun Tong as the zinc roof of their hut was blown away. Significant crosswinds affected the Hong Kong International Airport and over 380 flights were cancelled or delayed and five others diverted.

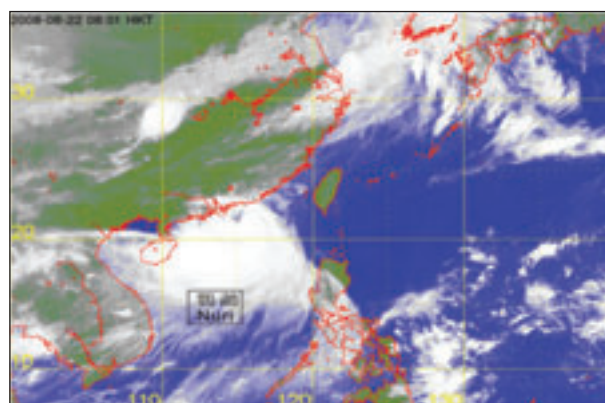


**Figure A-5. Satellite infra-red imagery of Kammuri at around 8 a.m. on 6 August 2008**

### 3.4 Typhoon Nuri

Typhoon Nuri formed over the western North Pacific on 17 August and tracked west-northwestwards. Nuri entered the South China Sea on 21 August and moved northwestwards in the general direction of Hong Kong. It passed Hong Kong on 22 August and moved further inland Guangdong on 23 August. Under the influence of Nuri, the weather became windy and rainy on 22 August. Local winds generally reached strong to gale force and a total of 61.6 millimetres of rainfall were recorded at the Hong Kong Observatory on that day. The outer rainbands south-east of Nuri continued to bring showery weather to the territory on 23 August.

Two people, including one swimmer and one Launch Mechanic, were killed and over 112 others were injured during the passage of Nuri. There were 122 reports of fallen or dangerous trees, more than 31 cases of dangerous signboards and eight reports of collapsed scaffolding. In particular, traffic in part of Nathan Road in Mongkok were disrupted for about 9 hours due to collapsed scaffolding. In Causeway Bay, the outer walls of the roof top of a building were damaged. The roof of two roof-top buildings were blown lose in Kwun Tong and Cheung Chau respectively. In Sham Shui Po, fallen scaffoldings damaged four vehicles nearby and injured two people. About 250 passengers had to be evacuated when a train was hit by a tree between Sha Tin and Tai Wai. Fishing rafts in Tai Po were severely damaged and the losses were estimated to be around three million Hong Kong dollars. At the Hong Kong International Airport, over 590 flights were either cancelled, delayed or diverted.



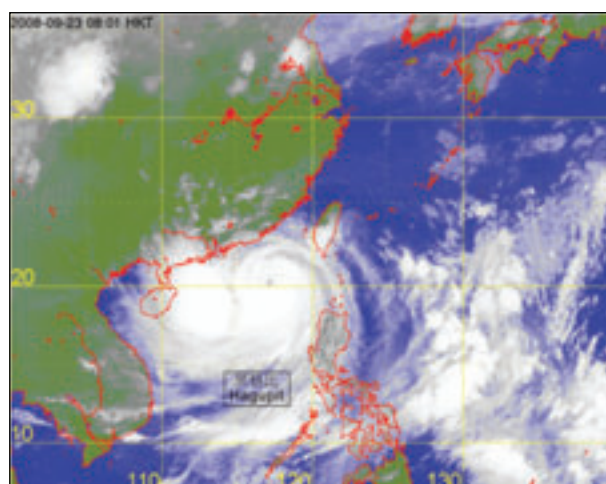
**Figure A-6. Satellite infra-red imagery of Nuri at around 8 a.m. on 22 August 2008**

### 3.5 Typhoon Hagupit

Typhoon Hagupit formed over the western North Pacific on 19 September. It moved first west-south-westwards and then northwestwards in the next two days. Hagupit entered the South China Sea in the evening of 22 September and approached the south China coast at a high speed of some 30 kilometres per hour on 23 September. It made landfall over the western coast of Guangdong the next morning. Under the influence of Hagupit, local weather was windy and rainy on 23 and 24 September. Local winds generally reached gale to storm force and a total of 77.8 millimetres of rainfall was recorded at the Hong Kong Observatory in these two days. The combined effect of the storm surges of Hagupit and high tides resulted in a maximum sea level of 3.53 metres at Quarry Bay, the highest since Typhoon Wanda in September 1962.<sup>7</sup> At Tai Po Kau, the maximum sea level was 3.77 metres and was the highest there since Typhoon Hope in August 1979.

At least 58 people were injured during the passage of Hagupit. There were 16 reports of flooding, seven of collapsed scaffolding and 46 of fallen trees. Around 4 500 trees were damaged with around 1 000 of them severely damaged. In Hung Hom, 50 windows of a residential building were blown out. Storm surges associated with Hagupit combined with high tides led to flooding and damages in the coastal areas. Huge waves damaged an embankment in front of a row of houses in Cheung Chau, forcing the evacuation of more than 100 residents. The waves also caused damage to the wooden seaside walkway in Discovery Bay and vehicles near the Ocean Park. Flooding due to back-flow of sea water affected low-lying areas in many parts of Hong Kong, including Tai O, Peng Chau, Tuen Mun, Sham Tseng, Sai Kung, Yau Tong, Lei Yue Mun and Chai Wan. The flooding in Tai O, which cut off electricity supply and affected more than 200 households there, was reported to be the most serious in the past 60 to 70 years. At least 10

vessels sank or were damaged near Peng Chau. On the Tsim Sha Tsui East promenade, three barges smashed into the seawall after they broke free from their anchors in the waterfront at Yau Tong. Three popular beaches on Lantau Island were severely damaged as waves brought tons of rubbish to the shore or washed away tons of sand. At the Hong Kong International Airport, over 400 flights were either cancelled or delayed. A Boeing Classic 747-200 cargo plane parked at the Hong Kong International Airport was rotated about 90 degrees under strong wind. Seven fishermen were rescued from a sinking boat at about 110 km northeast of Hong Kong but 17 crewmen were missing after a cargo ship capsized southwest of Macau.



**Figure A-7. Satellite infra-red imagery of Hagupit at around 8 a.m. on 23 September 2008**

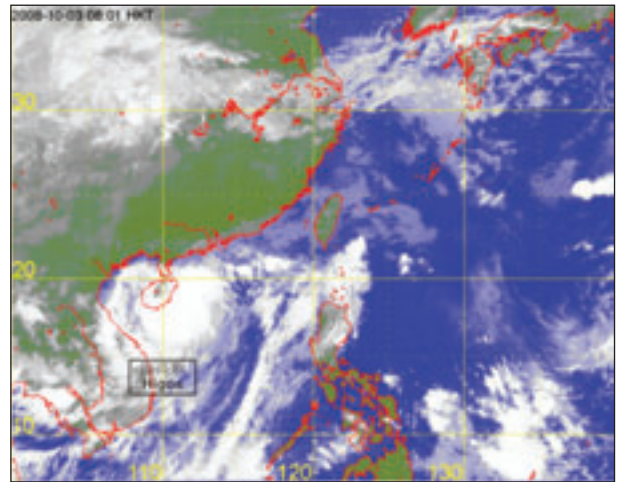
### 3.6 Tropical Storm Higos

Higos formed as a tropical depression over the western North Pacific about 2 000 km southeast of Hong Kong on the early hours of 30 September and moved northwestwards. It entered the South China Sea on 2 October and intensified into a Tropical Storm the next day. Affected by the outer rain-bands of Higos, it became cloudy with a few show-



ers on 3 October. Higos weakened into a Tropical Depression and made landfall over the western part of Guangdong on 4 October. Local weather remained showery on that day. Higos weakened further into an area of low pressure the next morning and moved eastwards along the coast of Guangdong.

Under the influence of the remnant of Higos and a cooler airstream over the south China coastal areas, there were some heavy squally showers and thunderstorms in the territory on 5 October. A sheet of glass fell off from a shopping centre in Tsim Sha Tsui, two vehicles were damaged and a person was slightly injured during the incident. In addition, a scaffolding was reported loose in Kowloon Bay.



**Figure A-8. Satellite infra-red imagery of Higos at around 8 a.m. on 3 Octob**





JAPAN

# Disaster Management System

## Introduction

To protect national land as well as citizens' lives, livelihoods, and property from natural disasters is a national priority. The turning point for strengthening the disaster management system came after the immense damage caused by the Ise-wan Typhoon in 1959, and led to the enactment of the Disaster Countermeasures Basic Act in 1961, which formulates a comprehensive and strategic disaster management system. Main contents of the Disaster Countermeasures Basic Act is (i) definition of responsibilities for disaster management, (ii) disaster management organizations, (iii) disaster man-

agement planning system, (iv) disaster prevention

and preparedness, (v) disaster emergency response, (vi) disaster recovery and rehabilitation, (vii) financial measures, and (viii) state of disaster emergency. The disaster management system has been further strengthened following the lessons learned from large-scale disasters such as the Great Hanshin-Awaji Earthquake. Japan's disaster management system (Figure A-9) addresses all of the disaster phases of prevention, mitigation and preparedness, emergency response

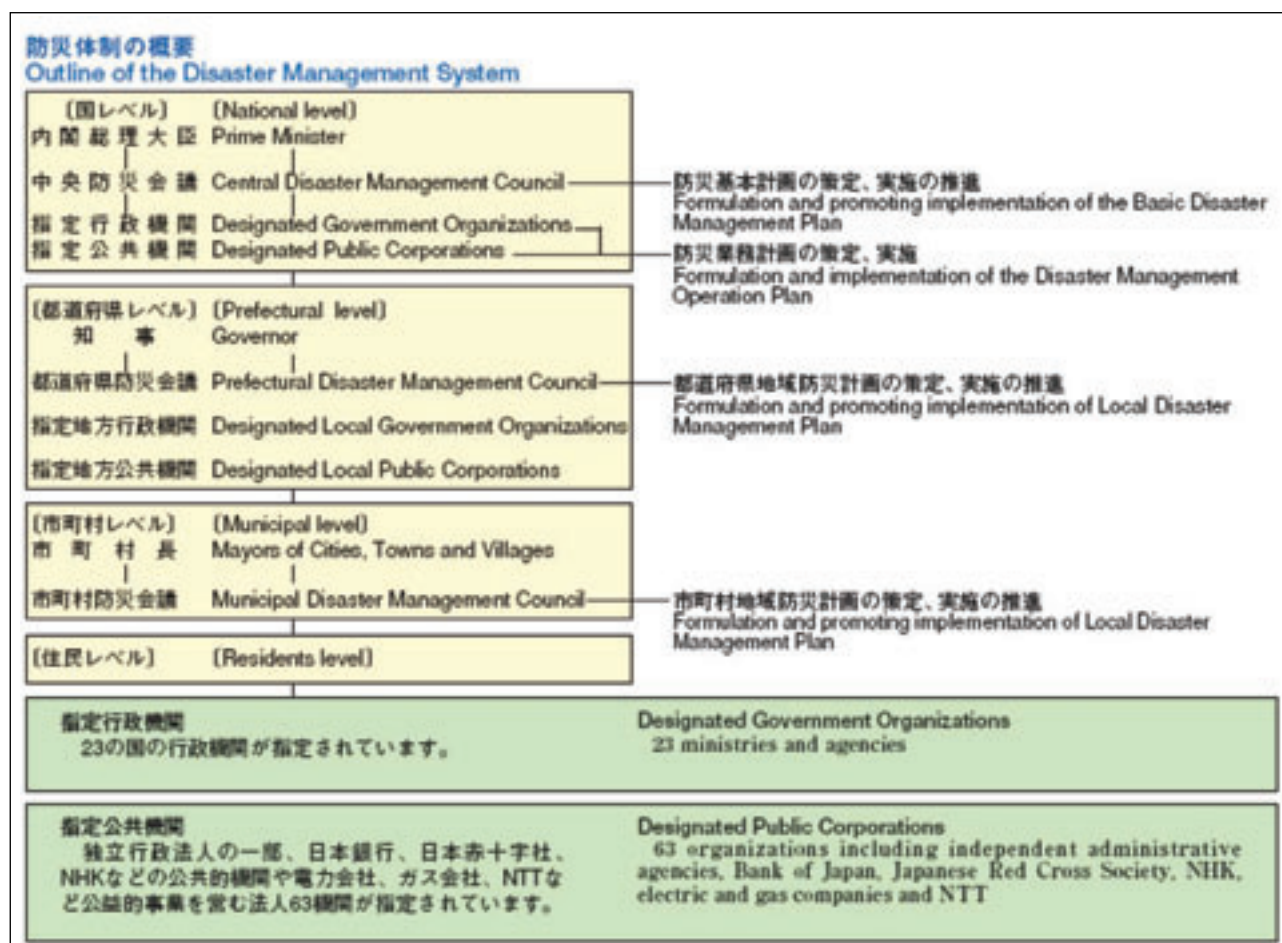


Figure A-9. Outline of the Disaster Management System

## 1. Establishment of Comprehensive Disaster Management System

### 1.1 The Cabinet Office

Along with a series of reforms of the central government system shown Figure A-10 in 2001, the post of Minister of State for Disaster Management was newly established to integrate and coordinate disaster reduction policies and measures of ministries and agencies. In the Cabinet Office, which is responsible for securing cooperation and collaboration among related government organizations in wide-ranging issues, the Director-General for Disaster Management is mandated to undertake the

planning of basic disaster management policies and response to large-scale disasters, as well as conduct overall coordination. Additionally, taking into account the lessons learned from the Great Hanshin-Awaji Earthquake, the Cabinet Secretariat system was also strengthened, including the appointment of the Deputy Chief Cabinet Secretary for Crisis Management and the establishment of the Cabinet Information Collection Center, to strengthen risk management functions to address emergencies such as large-scale disasters and serious accidents. Thereby, the Cabinet Office has a role in supporting the Cabinet Secretariat regarding disaster management matters.

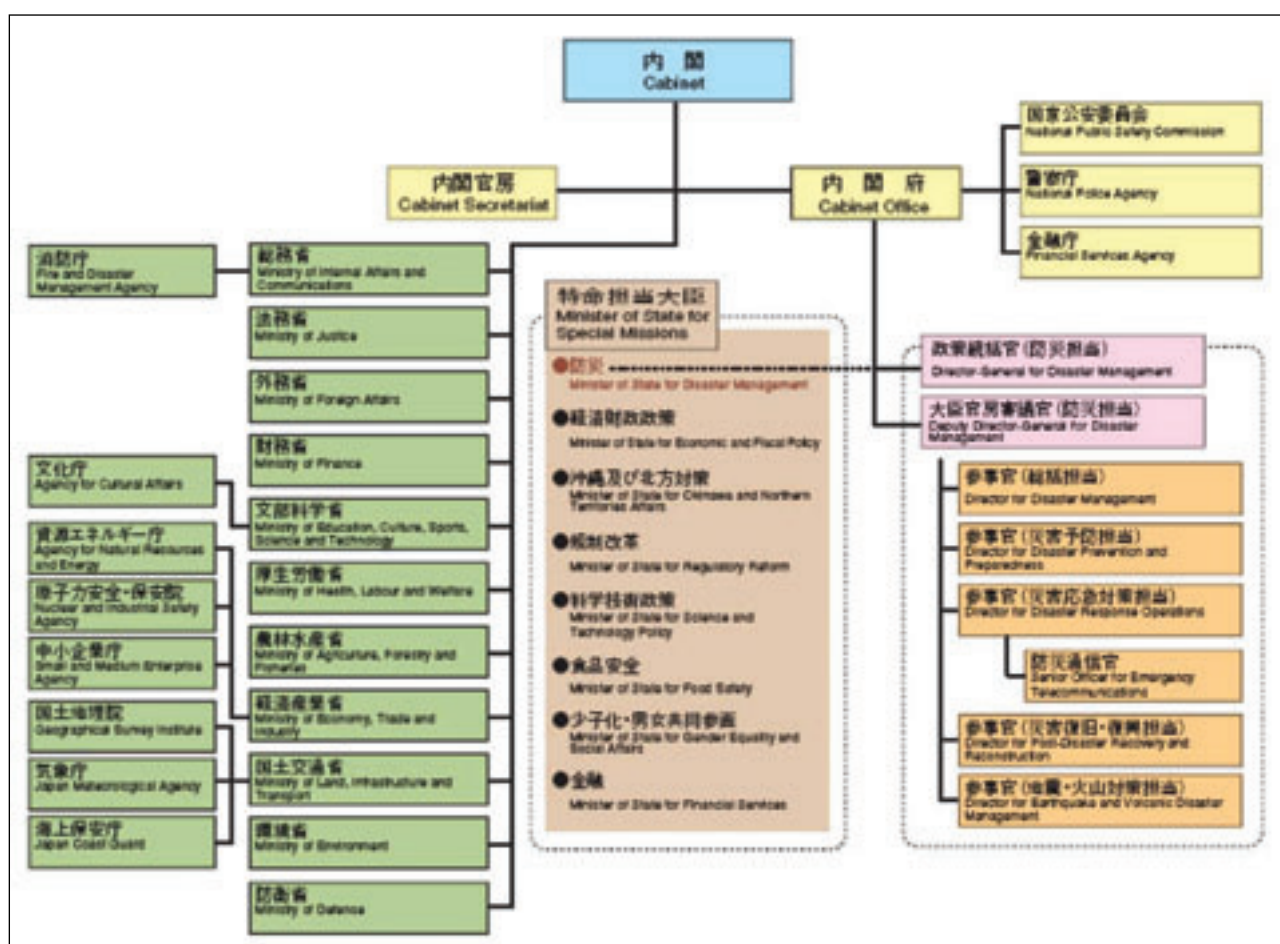


Figure A-10. Organization of National Disaster Management

# Disaster Management System

## 1.2 Central Disaster Management Council

The Central Disaster Management Council is one of the councils that deal with crucial policies of the Cabinet, and is established in the Cabinet Office based on the Disaster Countermeasures Basic Act. The council consists of the Prime Minister, who is the chairperson, Minister of State for Disaster Management, all ministers, heads of major public institutions and experts. The council promotes comprehensive disaster countermeasures including deliberating important issues on disaster reduction according to requests from the Prime Minister or Minister of State for Disaster Management.

### 1.2.1 disaster management planning system

There are three main plans in the disaster management planning system such as (i) Basic Disaster Management Plan which plan is a basis for disaster reduction activities and is prepared by the Central Disaster Management Council based on the Disaster Countermeasures Basic Act; (ii) Disaster Management Operation Plan which is a plan made by each designated government organization and designated public corporation based on the Basic Disaster Management Plan; (iii) Local Disaster Management Plan which is a plan made by each prefectural and municipal disaster management council, subject to local circumstances and based on the Basic Disaster Management Plan.

### 1.2.2 Basic Disaster Management Plan

The Basic Disaster Management Plan states comprehensive and long-term disaster reduction issues such as disaster management related systems, disaster reduction projects, early and appropriate disaster recovery and rehabilitation, as well as scientific and technical research. The plan was revised

entirely in 1995 based on the experiences of the Great Hanshin-Awaji Earthquake. It now consists of various plans for each type of disaster, where tangible countermeasures to be taken by each stakeholder such as the national and local governments, public corporations and other entities are described for easy reference according to the disaster phases of prevention and preparedness, emergency response, as well as recovery and rehabilitation.

## 1.3 Disaster Management Related Budget

The national budget for disaster management is Approximately 4.5 trillion yen (average annual budget From 1995 to 2007) accounting for approximately 5% of the total amount of the budget for general accounts. The percentage for each field is: (i) Scientific Technology Research, 1.3%; (ii) Disaster Prevention and Preparedness, 23.6%; (iii) National Land Conservation, 48.7%; and (iv) Disaster Recovery and Rehabilitation, 26.4%.

## Disaster Prevention and Preparedness

### 1. National Land Conservation

National land conservation projects such as river improvement, soil erosion control (sabo), and soil and coastline conservation are carried out strategically for protecting national land, citizens' lives and property from various disasters. Although long-term plans by field had been formulated in the past, the "Selective Infrastructure Improvement Plan" was set forth in 2002 to promote prioritized, effective and efficient infrastructure improvement projects. Additionally, the "Forest Improvement and Conservation Works Master Plan" was formulated in 2003 to promote comprehensive and effective forestry improvement and soil conservation projects.



## 2. Observing, Forecasting and Warning of Disaster Risks Observation System

Disaster Risks Observation systems that can accurately detect disaster risks in real-time have been progressively improved for establishing early warning systems, supporting the early evacuation of residents and response activities of disaster management organizations, and thereby reducing disaster damage. Organizations involved in disaster reduction, especially the Japan Meteorological Agency(JMA), use 24-hour systems to carefully monitor various natural phenomena and weather conditions. In addition to announcing observed information related to natural phenomena, the JMA issues a wide range of forecasts, warnings and advisories regarding earthquake generated tsunamis and severe weather events such as heavy rain.

## 3. Information and Communications Systems

The development of a quick and accurate communications system is essential for the effective use of early warning information. The Japan Meteorological Agency has therefore built an online system linking disaster management organizations of the national and local governments and media organizations. Disaster management organizations have also been developing radio communications networks exclusively for disasters: the Central Disaster Management Radio Communications System which connects national organizations; the Fire Disaster Management Radio Communications System which connects firefighting organizations across the country; and prefectural and municipal disaster management radio communications systems which connect local disaster management organizations and residents. The Cabinet Office has developed the Central Disaster Management Radio Communications System so that designated government organizations and designated public corporations can use telephones or facsimiles via a hotline, and has prepared an image transmission circuit so that pictures of disaster situations can be transmitted from helicopters in realtime. Furthermore, as a backup for terrestrial communications, a satellite

communications system has also been constructed. Simultaneous wireless communications systems using outdoor loudspeakers and indoor radio receivers are used to disseminate disaster information to residents. Tsunami and severe weather warnings are widely provided to citizens via TV and radio broadcasts.

## 4. Integrated Disaster Management

Information System Based on the experiences of the Great Hanshin-Awaji Earthquake, the Cabinet Office has been developing an integrated disaster management information system that helps to grasp the situation of the disaster early on and promotes information sharing among relevant organizations, thereby enabling quick and appropriate decision-making for emergency response operations.

### 4.1 DIS (Earthquake Disaster Information System)

DIS is automatically activated upon the receipt of earthquake(intensity level of 4 or greater)information from the Japan Meteorological Agency to estimate the approximate distribution of seismic intensity and scale of damage(human suffering and building damage)within 30 minutes.

### 4.2 RAS (Real Damage Analysis System by Artificial Satellite)

RAS uses satellite images to assess actual disaster damage when it is otherwise difficult to determine the disaster situation due to the disruption of transportation and communications networks.

### 4.3 PF (Disaster Information Sharing Platform)

PF is a common information sharing system with a standardized information format, where various disaster information provided by ministries and agencies, local governments, relevant organizations and residents, can be posted and freely accessed by all.

## 4.4 Development of Disaster Management Bases

In order to secure wide-area collaboration for quick and smooth response, and recovery and rehabilitation activities at the time of a large-scale disaster, disaster management bases with such functions as information management, operations coordination and logistics need to be developed and networks formed. The Cabinet Office is constructing main wide-area disaster management bases in cooperation with relevant ministries in Ariake-no-Oka(Tokyo)and Higashi-Ogishima(Kanagawa)in the Tokyo Bay area; these will function as core bases for responding to a large-scale disaster in the Tokyo metropolitan area. Additionally, subsidies are provided to local governments to promote qualitative and quantitative improvements of local disaster management bases.

## 4.5 Issuing of Evacuation Order and Instruction

When a disaster occurs or is imminent, residents may start evacuating on their own, and the mayor of the municipality may also issue an evacuation order or instruction. It is effective for municipalities to prepare a manual explaining the criteria regarding disaster situations that require the issuance of evacuation orders or instructions, thereby helping the mayor's quick decision. The Cabinet Office, in cooperation with relevant ministries, published the "Guidelines for Producing a Decision and Dissemination Manual for Evacuation Orders and Instructions" in 2005, and is promoting its implementation.

## 4.6 Measures for People Requiring Assistance during a Disaster

In view of the aging society and the increasing number of the elderly being killed or injured by disasters, measures to provide necessary assistance to those such as the elderly and physically impaired at the time of a disaster need to be reinforced. In cooperation with relevant ministries, the Cabinet Office published the "Guidelines for Evacuation Support of People Requiring Assistance During a

Disaster" in 2005(revised in 2006)to be implemented at the municipal level. The guidelines describe i)improving the information communications system; ii)sharing of information concerning people requiring assistance during a disaster; iii)creating a tangible evacuation support plan for those people; iv) assistance at evacuation centers; and v)collaboration among related organizations. Tangible countermeasures are included such as the issuance of evacuation preparation information which calls for the early evacuation of people requiring assistance, and sharing of information on people requiring assistance among disaster management and social welfare-related organizations(exceptional use of social welfare-related personal information to prepare evacuation support systems for the elderly and others).

## 4.7 Disaster Reduction Drills and Exercises

Disaster reduction drills and exercises are good opportunities to review the effectiveness of the disaster management system in view of quick and appropriate emergency operations, and to enhance public awareness through wide participation. The Disaster Countermeasures Basic Act stipulates the obligations of disaster reduction drills. In order to promote various drills and exercises nationwide, the Central Disaster Management Council sets forth an annual "Comprehensive Disaster Reduction Drills Plan," which stipulates the basic principles for executing the drills and outlines the comprehensive disaster reduction drills carried out by the national government in cooperation with local governments and relevant organizations. On September 1st, Disaster Reduction Day, wide-area, large-scale disaster reduction drills are conducted in every region across the country in collaboration with disaster related organizations. Additionally, drills based on the experiences of past disasters are conducted in every region throughout the year. In recent years, practical disaster reduction drill methods like role-playing simulation systems have been introduced, in which participants are not given any information beforehand and are required to make decisions and respond to the situation based upon the information provided after the drill starts.



## Disaster Emergency Response

### 1. Outline of Disaster Emergency Response

The national and local governments need to quickly collect and disseminate disaster and damage information, and secure communications so that they can carry out effective disaster emergency activities such as search and rescue and medical operations. Based on such information, local governments set up a disaster response headquarters and related organizations establish their own operations mechanism shown in Figure A-11. The national government collects disaster information at the Cabinet Information Collection Center 24 hours a day, and at the time of a large-scale disaster, the designated

emergency response team comprised of the director-generals of the respective ministries and agencies gathers immediately at the Crisis Management Center in the Prime Minister's Office to grasp and analyze the disaster situation, and report to the Prime Minister. Inter-ministerial meetings at the ministerial or high-ranking senior official level are held to decide basic response policies if necessary. According to the level of damage, the government may establish a Major Disaster Management Headquarters (headed by the Minister of State for Disaster Management) or an Extreme Disaster Management Headquarters (headed by the Prime Minister). Additionally, a government investigation team headed by the Minister of State for Disaster Management may be dispatched, or an on-site disaster management headquarters may be established.

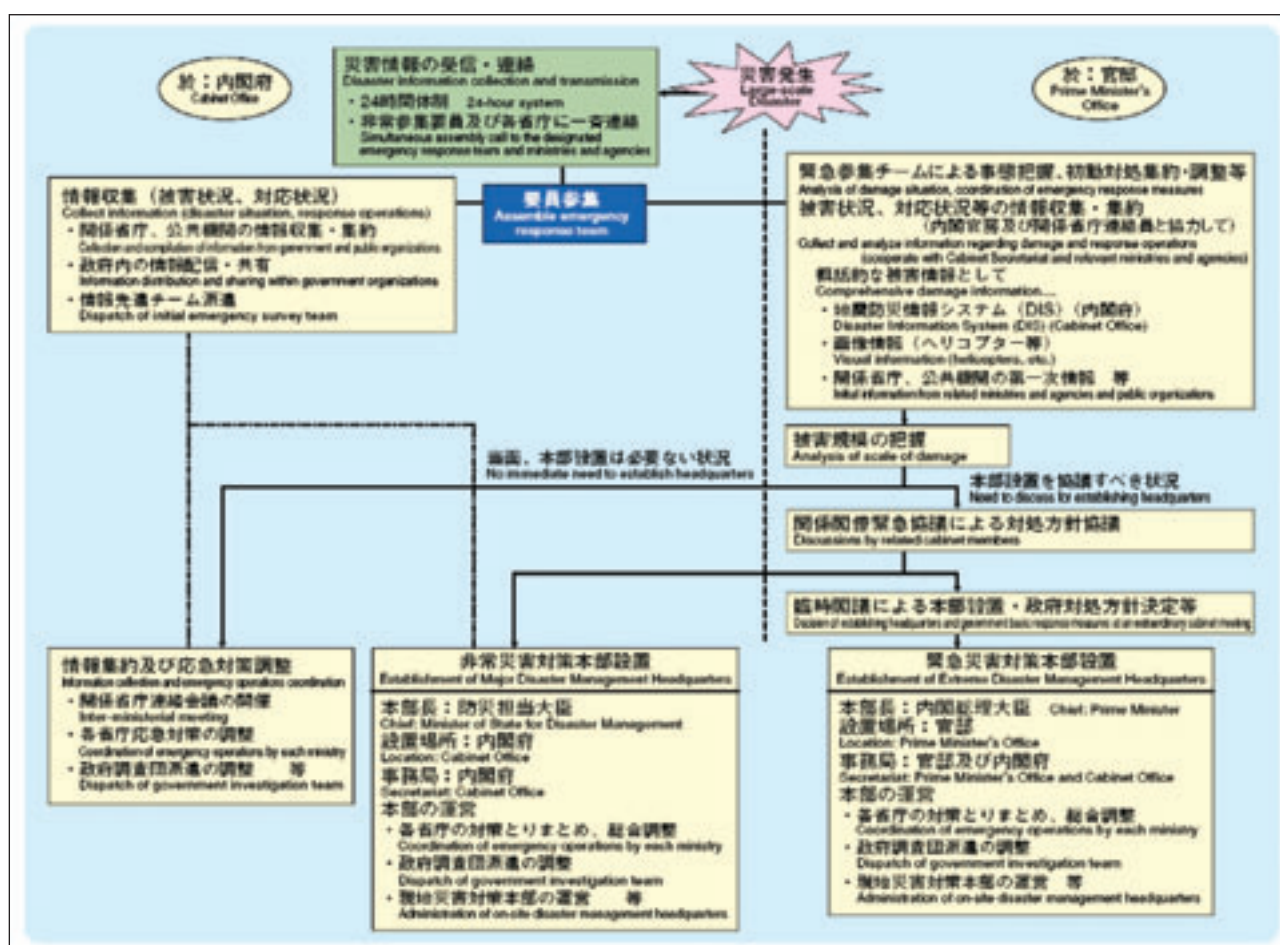


Figure A-11. Cabinet Office Disaster Response Mechanism

# Disaster Management System

## 2. Wide-area Support System

In the case of large-scale disasters that exceed the response capabilities of the affected local government, various wide-area support mechanisms are mobilized by the National Police Agency (Inter-prefectural Emergency Rescue Unit), Fire and Disaster Management Agency (Emergency Fire Rescue Team), and Japan Coast Guard. Furthermore, the Self-Defense Forces can be dispatched for emergency response activities upon request from the governor of the affected prefectural government. A wide-area medical transportation system for dispatching disaster medical assistance teams (DMAT) and ambulance parties for transporting seriously injured people to disaster management base hospitals outside of the disaster-stricken area is being developed.

## Disaster Recovery and Rehabilitation

### 1. Outline of Recovery and Rehabilitation Countermeasures

The recovery and rehabilitation of disaster-stricken areas focuses on providing support to help rebuild the normal livelihoods of the affected population as quickly and smoothly as possible, as well as on restoring public facilities giving consideration to mitigating future disasters so that affected communities can be made more resilient and have fundamental conditions for sustainable development. In the case of the Great Hanshin-Awaji Earthquake in 1995, the Headquarters for Reconstruction of the Hanshin-Awaji Area (headed by the Prime Minister) followed by the Inter-Ministerial Committee for Reconstruction of the Hanshin-Awaji Area in 2000 secured integrated reconstruction measures with multisectoral collaboration. In the case of the Mt. Usu Eruption in 2000 and the Niigata-ken-Chuetsu Earthquake in 2004, inter-ministerial recovery and rehabilitation committees were established. As such, ministries and agencies work together on dis-

aster recovery and rehabilitation, taking into account the opinions of those in the disaster-stricken area.

### 2. Disaster Victims Livelihood Recovery Support System

Following the Great Hanshin-Awaji Earthquake, the Act on Support for Livelihood Recovery of Disaster Victims was enacted in 1998. Funds of up to one million yen (per household) for buying necessary household goods and belongings are available, subject to given circumstances, to disaster victims whose houses are severely damaged by a natural disaster and who have great difficulty in restoring their self-supporting livelihoods due to economic and other reasons. The act was revised in 2004 and expanded with the establishment of a support system for ensuring stable residences, where assistance is provided for expenses related to stabilizing living conditions such as for tearing down collapsed houses (up to two million yen). Furthermore, the system has been actively and flexibly applied for cases of damage assessment of houses inundated by flooding.

### 3. Contents of Disaster Recovery and Rehabilitation Measures

#### 3.1 Disaster Recovery Project

The recovery of damaged public infrastructure facilities, educational facilities, welfare facilities and agricultural, forestry and fishery facilities is either conducted directly by the national government or put into practice by the local government with subsidies from the national government.

#### 3.2 Disaster Relief Loans

Persons engaged in the agriculture, forestry or fish-

ery industries, small and medium enterprises and low-income people who incurred damage are eligible for a variety of low-interest loans with rather generous conditions as compared to normal ones.

### **3.3 Disaster Compensation and Insurance**

Affected persons engaged in the agriculture, forestry or fishery business can obtain compensation for disaster losses. Earthquake insurance system has been established by the national government.

### **3.4 Tax Reduction or Exemption**

For affected persons, measures are taken for the reduction, exemption and postponed collection of income and residential taxes.

### **3.5 Tax Allocation to Local Governments and Local Bonds**

For affected local governments, measures such as delivery of special tax allocations and permission to

issue local bonds are taken.

### **3.6 Designation of Extremely Severe Disaster**

When a disaster causes extremely severe damage, it is designated an “extremely severe disaster.” Various special measures are to be taken for disaster recovery projects.

### **3.7 Assistance for the Rehabilitation Plan**

Assistance is provided, when necessary, for local government rehabilitation plans, which should be quickly and accurately formulated and implemented.

### **3.8 Support for the Livelihood Recovery of Disaster Victims**

Assistance is provided for victims to support their self supporting efforts through disaster condolence money, disaster impediment sympathy money, money for support of livelihood recovery of disaster victims and loans such as disaster relief funds and livelihood welfare funds.





LAO PDR

### Introduction

The Lao People's Democratic Republic is located in the Centre of southeast Asia which is having border with China 416 km to the North, Myanmar 230 km to the North West, Thailand 1.730 km to the West, Cambodia 492 km to the South and Vietnam 1.957 km to the East. From the geographic location, the width of some 40 km to 50 km in the Central province is vulnerable to Tropical depression and Typhoon originating in the Pacific Ocean or the South China Sea. Although PhuLuang mountain range along the Lao-Vietnam border is the natural barrier to protect Storm surge phenomenon, however heavy rainfall associated with these Tropical disturbances frequently caused severe flooding problems in Central and Southern plains.

Administratively the country is divided into 16 Provinces and 1 Capital is the Vientiane, about 135 districts and more than 15.600 villages. With total area of 236.800 square kilometers, 80% of which are mountainous, mainly in the Northern region, with a highest elevation of 2.820 meters and lowest elevation of 104 meters. The Mekong River shown in Figure 1 is the main geographical feature in the West and in fact from a natural border with Thailand in most areas. The Mekong River flows through nearly 1.900 km of Lao territory. It is the main river in Lao PDR, with the main 13 tributary from Lao PDR (for the lower Mekong basin). Total catchments area of 795.000 km<sup>2</sup> are distributed listed in the Table A1-3.

**Table A-3. Distribution of catchments area**

Country	Area, in Km <sup>2</sup>	Portion of Land, in %
China	164.565	20.7
Myanmar	20.670	2.6
Lao PDR	213.060	26.8
Thailand	189.210	23.8
Cambodia	151.050	19.0
Vietnam	56.445	7.1

The total population of the Lao PDR is 5.8 million (year 2005) with density about 24 persons/km<sup>2</sup>, and more than 68 different ethnic groups including three dominant ethnic groups following as: (i) Lao Loum is 75 % which they live in low land areas and along the rivers; (ii) Lao Sung is 20% which they live in the top of mountains; and (iii) Lao Theung is 5% which they live in the slope of the mountains. Approximately 20 % of the population lives in urban areas and 80 % of all inhabitants live in the rural area, most of them being small subsistence farmer, growing rice, maize, potatoes, beans, and vegetables as main crops.

Since the government of the Lao PDR set the new reform policy changing to a market mechanism

from the end of 1980, the country has been opened for investment converted to a market-oriented economy and launched a decentralization policy. In this policy, it is defined province as a strategic unit, district as a finance and planning unit and village as an implementing unit.

This is a basis for the construction of the national economy and set up the strong foundation for gradual industrialization and modernization processes. It has stabilized the macro-economic conditions as well as maintained the sustained growth and macro-balance, which keep good pace annually, GDP per capital of 2006 (US dollar/people/year) about 2.200 US \$.



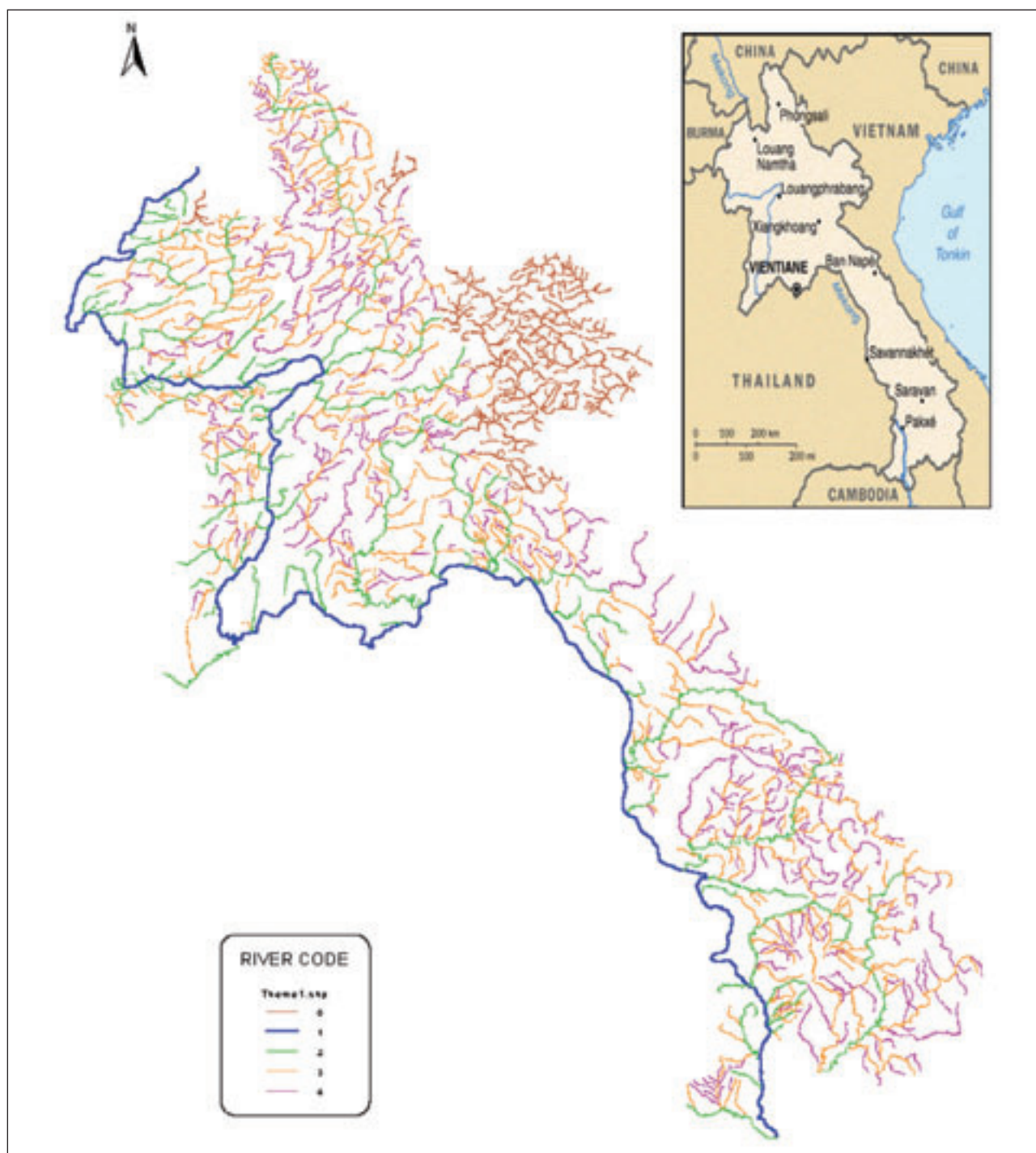


Figure A-12. Map of the Mekong River in the Lao PDR

## 1. Climate monitoring.

Lao PDR enjoys a tropical climate with two seasons it is rainy seasons, from the beginning of May to the end of September and dry seasons from October to April. Average temperature is about 25.0° C-28.8° C, rising to a maximum of 38.5° C-44.4° C in March-April in the Central and Southern, and minimum from 0° C to -3° C in December-January in the Northern.

## 2. Rainfall monitoring

Annual total rainfall is 1297.7?3492.6mm (Table AI-4) measured on rainfall station in Lao PDR shown in Figure 2. Forests account about 47 % of the country territory. Table AI-4 shows that about 88.4 % of rainfalls were concentrated during from May to September and 11.6 % of rainfall were concentrated during between October and April. A short drought was experienced between June and July.

**Table A-4. Comparisons of annual total rainfalls of each province**

Province	Annual Total Rainfall in (mm)	Rainy season May-October(SW)	%	Dry season November-April(NE)	%
Phongsaly (1990-2007)	1568.5	1310.6	83.6	257.9	16.4
Luangnamthat(1994-07)	1571.9	1269.2	80.7	302.8	19.3
Bokeo (1996-2007)	1839.3	1612.6	87.7	226.7	12.3
Oudomxay (1987-2007)	1533.6	1274.0	83.1	259.6	16.9
Sayabuoly (1969-2007)	1332.2	1129.6	84.8	202.6	15.2
Luangprabang(1951-07)	1292.7	1096.3	84.8	196.5	15.2
Xiengkhuang (1982-07 )	1374.0	1181.0	83.4	228.0	16.6
Houaphane(1976-2007 )	1662.4	1393.0	83.7	270.3	16.3
Vientiane(1951-2007)	1680.1	1512.9	90.0	167.2	10.0
Paksane (1996-2007)	3492.6	3214.7	92.0	278.0	8.0
Thakhek (1987-2007)	2441.9	2225.6	91.1	216.3	8.9
Savanakhet(1971-2007)	1494.4	1384.3	90.2	146.0	9.8
Saravan (1989-2007)	2085.5	1930.2	92.6	155.3	7.4
Pakse (1951-2007)	2039.9	1905.5	93.4	134.4	6.6
Paksong (1983-2007)	3443.0	3091.4	89.8	351.6	10.2
Sekong (1992-2007)	1587.3	1361.2	87.9	192.5	12.1
Atapeu(1989-2007)	2367.3	2198.8	92.9	168.6	7.1
Mean	1835.2 mm	1622.8 mm	88.4 %	212.4 mm	11.6 %

## 3. Temperature monitoring

Temperature of Lao PDR is continuously increasing and the rain does not come properly which results in a number of adverse impacts to the economic

system, environment and the livelihoods of people of all ethnic groups. Thus, climate change poses as a great challenge for the Lao PDR to tackle and adapt to climate change conditions and minimize the emission of those greenhouse gases. Mean

minimum temperature is 13 -17°C during winter season from December to January. The normal minimum temperature on January is generally from 8 to 17°C shown in Figure A-13. Mean maximum temperature is 35-39°C from March to April.



Figure A-13. Rainfall Network in Lao PDR

## Disaster Management system

The DMH established since 1954 is a member of World Meteorology Organization (WMO) since 1955. Since 27th July 2007, Department of Meteorology and Hydrology transferred from Ministry of Agriculture and Forestry to Water Resources and Environment Administration (WREA) shown in Figure A-14 with the great important role on securing Lao community in Meteorology and Hydrology. The professional organization in serving the need of national users for Meteorological, Hydrological and Typhoon related services in support of safety and sustainable development of Lao community. The DMH has high potential in producing Meteorological and Hydrological warnings, Climate forecast

to reduce the loss of life and property in severe weather. The DMH set up and establish of Meteorology and Hydrology network over the country. The DMH perform monitoring, collecting, processing and analysis Meteorological and Hydrological data and providing services to users.

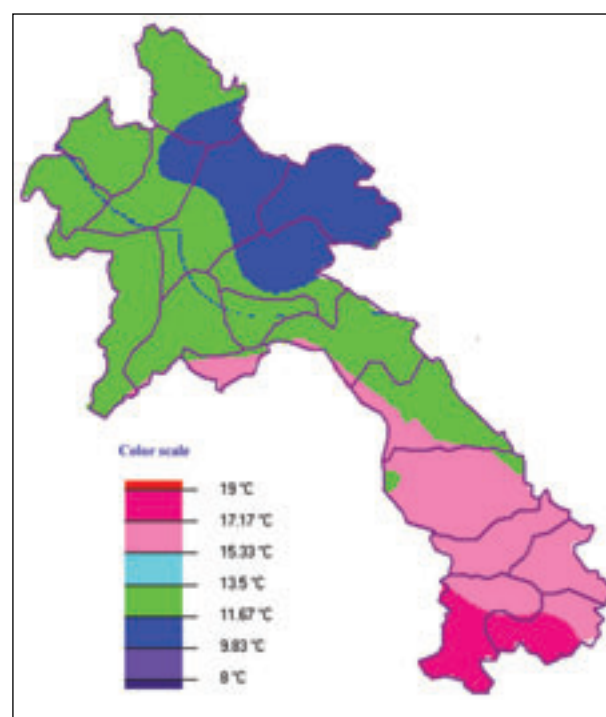


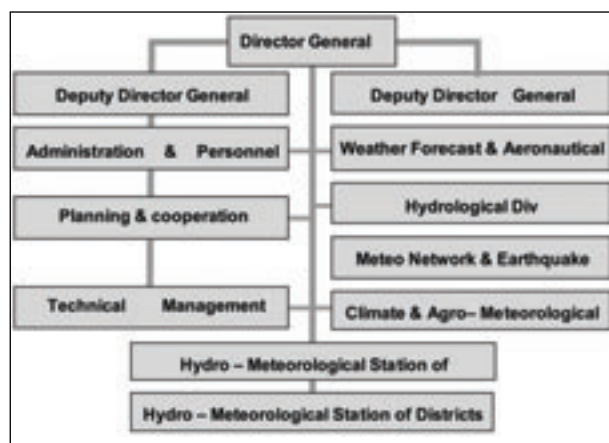
Figure A-14. The January normal minimum temperature in °C

logical and Hydrological warnings, Climate forecast to reduce the loss of life and property in severe weather. The DMH set up and establish of Meteorology and Hydrology network over the country. The DMH perform monitoring, collecting, processing and analysis Meteorological and Hydrological data and providing services to users.

The Department has an establishment of 212 staff, of which 67 are at the headquarters in Vientiane Capital. There is a provincial hydro-meteorological station at each of the provinces which is responsible for collecting meteorological and hydrological data and sending them to the headquarters. The provincial hydro-meteorological station is also

## Disaster Management System

responsible for relaying weather forecasts and warnings from the headquarters to relevant provincial authorities. There are also a number of district hydro-meteorological stations which are primarily responsible for collecting meteorological and hydrological data.



**Figure A-15. Diagram of Organization of the National Disaster Management Office**

Within the Ministry of Labour and Social Welfare, the National Disaster Management Office (NDMO) with the support of the United Nation Development Programme (UNDP), have been taken the responsibility in 1997 for the formulation of the government policy on Disaster Management in Lao PDR. The new approach emphasizes the role of the government in tackling disasters, the importance of Disaster Preparedness, Community-Based Disaster Management (CBDM) approach, the recognition of disaster risk and vulnerability reduction as a cornerstone of sustainable development and the coordination between community and government at different levels and strengthening community self-reliance. In line with the national strategy, the NDMO has developed a National Disaster Management Action Plan, which is broken down into three different periods (2001-2005, 2005-2010, and 2010 - 2020). This Action Plan was advanced and

approved by the members of National Disaster Management Committee (NDMC) in line ministries and signed by chairman of NDMC.

A landmark decree No. 158, signed by the Prime Minister in August 1999, provide for the establishment of an inter-ministerial National Disaster Management Committee (NDMC) as a policy making and coordination body. This organization started from central government called NDMC and down to provincial, districts and village levels. The NDMO is played a secretariat of the NDMC and has a key function to build coordination procedures among Disaster Management Organizations and with among Government Institutions, other agencies and stakeholders such as: UN, International NGOs and Organizations.

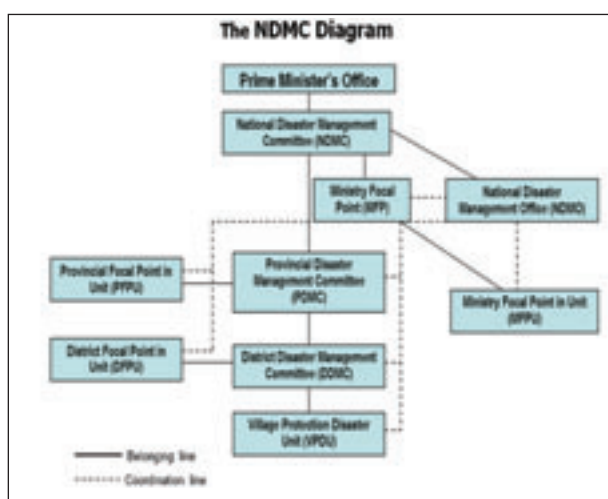
The NDMC shown in Figure 5 consisting of representatives from 13 key Ministries such as Minister of Ministry of Labour and Social Welfare, Vice-Minister of Ministry of Agriculture and Forestry, Chief of Cabinet Ministry of Foreign Affairs, Chief of Cabinet Ministry of Defense, Chief of Cabinet Ministry of Interior, Chief of Cabinet Ministry of Education, Director of Budget Department, Ministry of Finance, Director of Transportation Department, Ministry of Communication, Transport, Post and Construction, Director of Industry Department, Ministry of Industry and Handicrafts, Director of Hygiene Department, Ministry of Health, Director of Mass Media Department, Ministry of Information and Culture, Director of Social Welfare Department, Ministry of Labour and Social Welfare, and Chairman of Lao Red Cross.

The NDMC roles are (i) acting on behalf of Government on Disaster Management and functioning through NDMO as its secretariat; (ii) determining and criterion for resources; (iii) implementing policies and making decisions on inter-Ministries basic; (iv) coordinating and cooperating with all government ministries and agencies on disaster management in all phases such as preparedness, emer-



gency assistance and mitigation; (v) to develop policies, including national disaster management plan, and provides overall direction for provincial and district plans (Country Report, 2003). NDMC has responsible for major operational decisions during an emergency, decides on allocation of relief resources, and makes report to government.

The NDMC is coordinating disaster prevention and protection activities and efforts in the country (Country Report, 2003). It promotes disaster reduction activities of existing Line Ministries and Provinces on natural disaster management and protection which consists of representatives of key ministries, institutions and provinces. Macro-level disaster management is being carried out by Ministry of Labour and Social Welfare (LSW) and Science Technology and Environment Agency (STE), while each technical ministry and province has responsibility over their respective environment relating the disaster management in close cooperation with MLSW, STE; Lao Red Cross (LRC), the Ministry of Agriculture/Forestry and Ministry of Health etc.



**Figure A-16. Diagram of Organization of National Disaster Management Framework in Laos**

## Priority on Disaster Risk Management

With recognizing that the managing the risk to disaster and reduction of vulnerability are essential elements of sustainable development. The priority for disaster management in Lao PDR is (i) to develop a rational Disaster Risk Management Plan will focus on mobilization, deployment and coordination of National Resources and requests for international Assistance; (ii) to prepare Disaster Risk Management Plans at provincial, district and local level; (iii) to develop and train community level disaster response teams; (iv) to target the initial efforts on the risk management of floods and droughts; (v) to focus on capacity building of government officers and personnel of associated agencies from the community level to the national level and on community mobilization; (vi) to improve disaster preparedness; (vii) to focus disaster prevention and mitigation on; and (viii) to improve disaster response and recovery by improving emergency management systems such as command, control and coordination, damage and need assessment, relief distribution and "Food for work" rehabilitation and reconstruct programs (Country Report, 2003).

## Preparedness and Training

The People's Democratic Republic of Laos (Lao PDR) faces a range of disasters including flood, drought, landslides, as well as unexploded ordinance, fires and other man-made hazards. An analysis of disaster impacts on urbanizing areas, however, finds that fires and traffic accidents cause the greatest loss of life and property. Dense building concentrations, narrow roads, flammable building materials, aging water and electrical supply systems, and lack of resources to upgrade preparedness and response have resulted in a growing risk of large scale, multiple structure fires. The Lao PDR Urban Disaster Mitigation Project (LUDMP) focuses on these two major hazards (fire and traffic acci-

## Disaster Management System

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dents). It generally aims at incorporating risk management and hazard mitigation into the development planning of urban areas in Lao PDR, with the city of Vientiane as the pilot demonstration site.

The main objective of the LUDMP is to reduce the disaster vulnerability of population, infrastructure, and economic assets in Lao urban areas to fires by establishing systems for hazard assessment and disaster mitigation to ensure fire and road safety for the city of Vientiane, and other major cities and communities in Lao PDR. More specifically, the project aims to (i) conduct a risk assessment of Vientiane, both at the city and community levels; (ii) build capacity for prevention and response within the city's emergency service departments; (iii) establish a public awareness campaign; and (iv) improve the regulatory system for fire mitigation

### Disaster Management Plan

The National Disaster Management Plan for the period 2001-2020 has been formulated, while provincial disaster management plans are still under development. Provincial plans are based on the specific hazards in the locality. National Strategy Plan on DM is consisted of the works expressing in the general vision to 2020. The General Objectives of the National Action Plan on DM to 2020 are (i) to make Lao society safe and could be able to reduce the negative impacts of disaster to people lives, economy, state assets and people properties; (ii) to make sure that people who were affected by disaster have been assisted on time and quickly recovery; (iii) to make regulations with fully insurance welfare; and (iv) to make linkage program between Disaster Management and other sector programs.

The goals of the National Action Plan on DM from 2001 to 2010 are (i) to establish the District Disaster Management Committee in all districts; (ii) to make identification of the focal point in all sectors; (iii) to

develop and establish early warning and information system in all of 142 districts in country; (iv) to make setting up information network in disaster prone villages; (v) to make construction of warehouses for storing the emergency assistance materials in all provinces and some disaster prone districts; (vi) to attend continue public awareness activities with media; (vii) to make widely organizing training on DM for all sectors and levels; (viii) to organize simulation exercise with the involvement of rescue team unit in sectors and community; and to raise capacity up on cooperation with other countries in the framework of Asian, Regional and United Nations to exchange information and experiences on DM.

### Recent major disasters

In the rainy season, agencies whose in charge of gathering information has closely coordinated with NDMO which collected information are listed in Table AI-5. National Disaster Management Office has got the data of weather forecasting from Meteorology and Hydrology Department, Mekong River Commission and getting news from international mass media. While data and information collected, NDMO will be providing through network agency of provincial disaster management coordinator which located along the Mekong River where prone to flooding. NDMO will be core agency of checking up information through media for instance: National Television Broadcasting, Newspaper, National Radio and Provincials located by the side of Mekong River.

Vong Phong typhoon which came from South China Sea made of heavy rain at upstream reservoir of Mekong River in August 14th, 2002 at Houaysai, Bokeo province. Flooded August 16th, 2002 Mekong flooded Luangprabang province and August 18th, 2002 water came to Vientiane and getting higher through tributaries of Mekong River and caused of water level at warning point (12,5 m) in



Vientiane Municipality and keep continuing higher, and raining can't drain out that caused water level get higher and higher. During this period, broadcasting of flood warning had been made many times and every 30 minutes through Nation and

Provincial Radio and TV to alert people who have been living the hazard prone areas particularly near by the Mekong River and its tributaries in order to evacuate and take away of things to safety place in case of water getting higher to flooding.

**Table A-5. Statistic natural disaster in Lao PDR**

No	Year	Types of Damage	Damage Cost(US\$)	Place of Damage
1	1990	Flood	100.000	Central
2	1991	Flood and Drought	3.650.000	Central
3	1992	Flood, Drought and Forest fires	302.151.200	Central (F), and Northern (D)
4	1993	Flood and Drought	21.827.927	Central and Southern
5	1994	Flood	21.150.000	Central and Southern
6	1995	Flood	15.300.000	Central
7	1996	Large flood and Drought	10.500.000	Central
8	1997	Flood and Drought	1.860.300	Southern
9	1998	Drought	5.762.715	Northern and Southern
10	1999	Flood	7.450.000	Central
11	2000	Flood	12.500.000	Central and Southern
12	2001	Flash flood	8.000.000	Central and Southern
13	2002	Large flood ,Flash flood and land-slight	24.454.546	Northern, Central and Southern
14	2003	Drought	16.500.000	Northern and Central
15	2004	Flood	20.750.000	Southern
16	2005	Flash flood and land- slight	218.304.000	Central and Southern Northern, Central and Southern
17	2006	Flood and Strong Wind	3.207.968	ern
18	2007	Flood	977.960	Central

Paddy fields, gardens and people's cultivation product were inundated by Mekong River and Ngum River (Nam Ngum) in urban areas of Vientiane Municipality. Prime Minister was setting up the ad hoc committee for flood fighting in the year 2002 which presided by Agriculture & Forestry Minister. Role and function of the ad hoc committee is to collaborate with the National Disaster Management

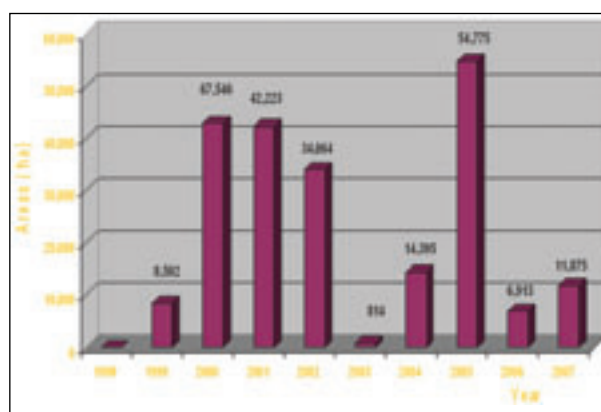
Committee for flood prevention and fighting in this year. The ad hoc committee for flood fighting met Vientiane authority officials and districts to make a flood prevention plan for instance: proof of embankment along Mekong River, set up teams to monitor water level and water gate and other areas which embankment are weak by encourage local security guards to collaborate with district police for

## Disaster Management System

watching throughout 24 hours. The ad hoc committee for flood fighting in year 2002 had delegated its responsibility to Vientiane Authority Officials and Irrigation Officials to catch up and watching regularly of flood situation. The inspection Committee was also set up in order to do daily follow up issues with consists of various government agencies. Proofing of embankment and water gate had been carried out under the Agriculture sector to provide mechanic. Transportation and communication section in charge of sand supplier and Labour & Social Sector was a sand-bag supplier. Mass media is a core point for stimulation of sand-bags and kinds contribution from NGOs and private sectors and etc... Dried food, rice, pure water and other nutrients are also donated to the flood victims by the Disaster Management Committee. Boat mobilize force which get collaborated by private sectors & village security guards to evacuate people, animals and needed things in flooded area along river bank. Beside that those force also mobilized food, pure water and medicines to distribute to flood victims at temporary sites. At the district and village level was encouraging the youth forces and volunteers to work on improving embankment and set up team to give watching through 24 hours. Chairman and members of flood relief committee distributed relief packages and medicines to flood victims in 4 districts and Ministry of Agriculture had distributed organic fertilizers, vegetable, rice and corn seeds to various villages for replanting after flood.

The main hazards in Lao PDR are flood and droughts both are dependent on the amount of rainfall. If there is less than 2,000 mm rainfall in the year, drought sensitive areas will be effected. More than 200 mm in 2 days certainly leads to floods along the Mekong plain. Cyclones are therefore not direct hazard, since their force in normally diminished once they have reached Lao from the South China sea, but they can produce flood as a conse-

quence of heavy rainfall. Up to three cyclones hit the country annually, while flood, droughts and land-slide occur irregularly. Another hazard is deforestation. It is a direct hazard to the natural environment , but also significantly contributing to the worsening of the effects of 'normal' hydrological and meteorological phenomena, causing an increase of the surface runoff in quantity and velocity (natural flood mitigation is lost). In recent years natural disasters resulting from climate abnormalities have occurred more frequently especially droughts and floods.



**Figure A-17. Rice field damages by flood from 1998 - 2007 (MAF)**

### 1. Flood in the year 2008

Year 2008 Lao PDR against occurred big flood. On date 8 Aug 2008, Typhoon KUMMURI approach Lao PDR, heavy rainfall occurred in the Northern region, period 12-15 August 2008, in Vientiane Capital occurred big flood from the Mekong River. Damage from this flooding were that (i) Vientiane capital was effected 8 districts, 160 villages and (ii) 12,965 families are threatened by flooding (Table AI-6).

**Table A-6. Damages in Vientiane Capital year 2008**

Contents	Number	Unit
Villa	160	Unit
Family	12.965	Unit
School	35	Unit
Fed fish	71	Unit
Fishpond	314	Ha
Hospital	5	Unit
Temple	10	Unit
Tourist	1	Unit
Agriculture area	22.430	Ha
Small irrigation effected	21	Unit
Buffalos and Cow	461	Head
Total Damages Cost		23.353.000 US\$

Government moves 1.126 families from flooding area to safe place. On this flooding Prevention includes all Ministries, International Organization, and Vientiane people totally 58.333 people, 4.171

people are officer and other 54.162 people to protection dike 17 km along the Mekong River and low places by sandbags (Figure A-18 and Table A-7).

**(a) Dike Protection 13 Oct 2008****(b) Move people to safety place 13 Oct 2008****Figure A-18. Photo of dike protection and moving people to safety place**

## Disaster Management System

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**Table A-7. Assist from national, international and some family to the people's affected on this flooding in period 12-20 AUG 2008**

No	Item	Unit	Cost US\$
1	Sandbags	2.500.000	1.000.000
2	Drinking water	9.448	75.584
3	Noodle	2.050 boxes	10.250
4	Rice	7 tons	70.000
5	Fished can	1.525 packs	7.625
6	Medicines		104.819
7	Gasoline		588.236
8	Money		34.940
Total			1.891.454 (US\$)



MACAO, CHINA

## Introduction

As a special administrative region of China, Macao government always dedicates efforts to supporting Macao's sustainable development and social stability, while also making effort on the enhancement of civil protection affairs. In the aspect of civil protection, a series of laws concerning natural disasters, including a decree-law emphasized on the civil protection, the Internal Security Legal Framework, an executive order on approval of the symbol and meaning of tropical cyclone in different scales as well as the instructions in response to various tropical cyclones, a dispatch on stipulating the response to different scales of tropical cyclone and rainstorm specially for schools and students, a dispatch on prescribing the response to the tropical cyclone for public sector and entities, and so on, have been established. A brief description of these laws or regulations and links to their web-pages are provided as follows. Unfortunately, all rules and regulations of these laws shown on the web-page have Portuguese version and Chinese version only since the official languages in Macau SAR (MSAR) are Portuguese and Chinese. Decree-Law no. 72/92/M, 28 September 1992 is a law formulated for civil aid, particularly during the occurrences of any serious incident or disaster and, which may put masses or certain number of people in danger within MSAR. It contains a series of regulations defining mainly the basic principles in the related fields or situations and, policies, tasks and joint operations as well as some other measures related with civil protection scheme that might need to further consider or reinforce by some relevant authorities and or with the collaboration with other private enterprises (<http://bo.io.gov.mo/bo/i/92/39/declei72cn.asp>).

Law No. 9/2002, "Internal Security Legal Framework" is a law mainly for ensuring the social order and stability, and so on. In this respect, a security committee, comprising of most public security authorities (including the Unitary Police Service, Customs, Public Security Forces, Judiciary Police,

Fire Services Bureau) and some other related public departments (such as the Civil Aviation Authority and Port Authority), has been formed to establish appropriate policies and measures in the related fields to cope with any changing environment and conditions, and to encourage the cooperation between public and private sectors to pursue the aims of civil protection and combating crimes. In addition, the identities as well as the functions of both Security Forces Coordination Office (GCSEg,) and Joint Command have also been reinforced and, the composition of the internal security system has also been specified (<http://bo.io.gov.mo/bo/i/2002/49/lei09cn.asp>).

Executive Order No. 16/2000, some basic concepts relating to typhoons, including the symbols of different typhoon signals and their meanings have been well defined. In addition, a series of forth safety instructions on each typhoon signal has been included too ([http://bo.io.gov.mo/bo/i/2000/10/bo10\\_cn.asp](http://bo.io.gov.mo/bo/i/2000/10/bo10_cn.asp)). Dispatch no. 87/2000 of the Secretary for Social Affairs and Culture, some measures applicable to the educational institutes or agencies in particular during the hoisting of any typhoon signal or rainstorm have been established so as to provide a clear forth guidance to all schools and students to follow and respond ([http://bo.io.gov.mo/bo/i/2000/48/despasac\\_cn.asp#87](http://bo.io.gov.mo/bo/i/2000/48/despasac_cn.asp#87)).

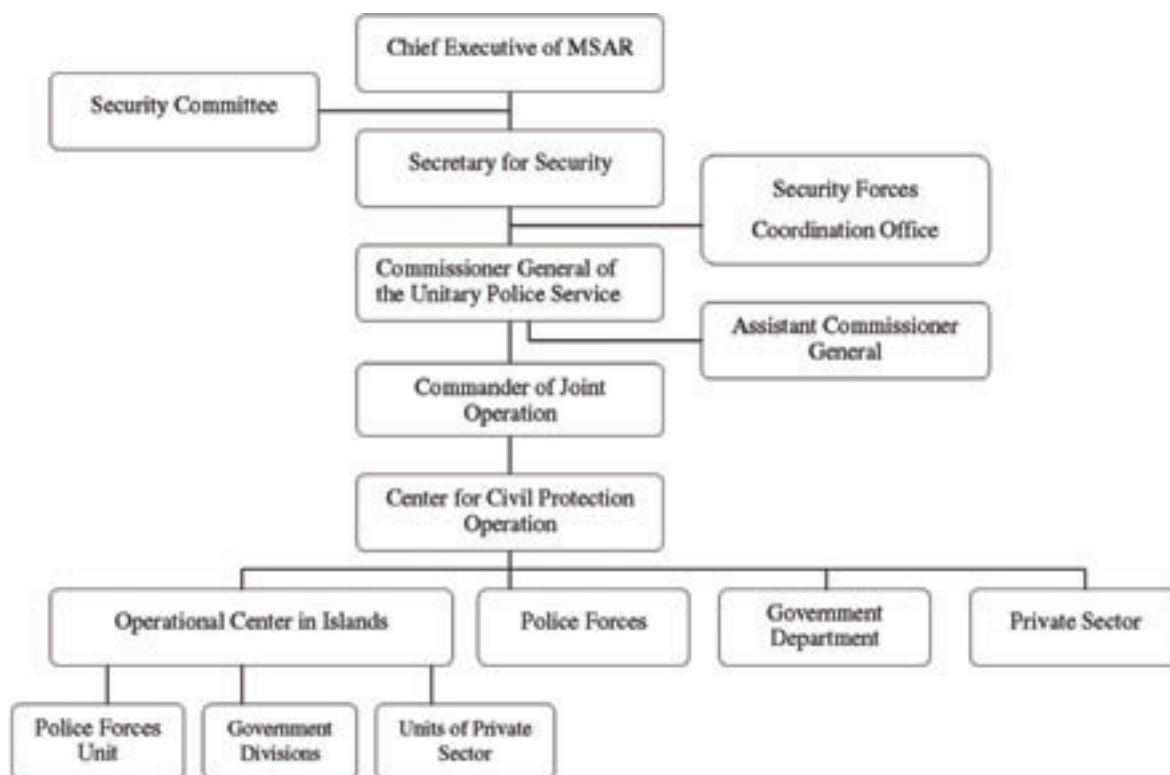
Executive Dispatch No. 166/2002, contains certain directives for all public departments or entities to follow or perform when there is typhoon signal No. 8 or above issued, and to consider further appropriate policies and mechanism respectively to ensure the Civil Protection Framework to be activated effectively if required. Furthermore, all traffic including the land, aviation and marine traffic must be suspended or partly suspended in accordance with the specific circumstance ([http://bo.io.gov.mo/bo/i/2002/28/despce\\_cn.asp#166](http://bo.io.gov.mo/bo/i/2002/28/despce_cn.asp#166))

Security Forces Coordination Office (GCSEg.),



which is subordinate to the Secretary for Security with the authorities empowered by the Chief Executive of MSAR, is a special office mainly taking responsibility of the civil protection affairs, particularly in combating against natural disasters as well as man-made disasters or incidences. As such, the office continuously makes effort to organizing, coordinating, monitoring and commenting on the related activities and issues such as strategy planning, establishment of contingent measures and mechanisms, and so on. In addition, in order to maintain the effective operation of the Joint Command Center for Civil Protection, which is located in the GCSEg. and will be activated when there is in need to deal with the occurrence of any disaster or emergent incident on certain level, a range of some other work tasks need to be managed by the office as well. For instances, such works as maintaining all software and hardware inside the center to ensure them in a good condition, planning and forecasting all required human resources and

materials, keeping good communication with all departments or agencies, composed of the Civil Protection Framework, in either public or private sector are performed daily or regularly. Concerning the Civil Protection Framework, it is included in the Civil Protection Plan for Typhoon that was formed subject to the laws stated above for dealing with specified emergencies, particularly the typhoon and any other typhoon-related disaster. The framework is composed of both public sector, including most of public security authorities and some other government departments such as Meteorological and Geophysics Bureau (SMG), Government Information Bureau and so on, and private sector such as hospital, fundamental facility managing company, public utility companies, etc. The framework structure is shown in Figure A-19. Tasks and duties of each party and instructions for each of them have been well defined and included in the plan.



**Figure A-19. The Organizational Chart of the Civil Protection Framework**

## Priorities of Disaster Risk Management

It is believed that close cooperation in the region can help with information and experience exchange. Particularly along with such rapid and varied changes in global environment, monitoring the changes and employing applicable policies are very important to any national or regional government. Therefore, actively taking part in international or regional activities related to the disaster risk management is a significant way.

To enhance citizen's cognition about the rapid changing environment and its possible impacts, it is one of primary objectives of Macao government for disaster reduction. As such, promotion and education for drawing public's awareness of disasters need to be conducted or reinforced constantly. It is considered to be an essential time and more easily draw their attention, particularly because the severe cold, earthquakes, torrential rainfall and flooding were occurred in China or neighboring countries in the first half of this year.

To reduce disaster as well as its impacts, one essential and effective way must be to slow down the climate change. It is believed that this can be achieved by encouraging the environmental protection and conservation.

To keep good communication with relevant departments and collaboration with them is undoubtedly helpful to any disaster prevention and preparedness since active as well as effective information and comments exchange will help with disaster impact assessment from different ways and angles.

## Mitigation

It is believed that the key and best way to mitigate the impacts of disaster is to recognize fully and analyze the actual situation and impacts of a disaster,

then to carry out corresponding strategy plans or to find out an effective solution afterwards. For this aim, submission of report from some specific departments after the occurrence of each disaster is required, so as to analyze the reports and monitor any changing.

### 1. Submission of Report on a Disaster

In accordance with the rules of relevant laws, it is obligatory for both relevant public and private sector to provide all supports on civil protection. As such, report on each disaster written by relevant departments included in the Civil Protection Framework requests to be submitted to GCSEg within a specified period in accordance with the instructions of following plans. -Civil Protection Plan for Typhoon -Instruction Plan for the Occurrence of Earthquake and Tsunami -Guidance for Rainstorm Warning and Thunder Warning (issues relating with landslide and flood are also included)

### 2. Analysis and Monitor

Through the analysis of reports and their practical information, one of the main functions in GCSEg., monitoring the firmly implementation of relevant plans, is able to be realized. On the hand, any change in recent environment can also be recognized immediately in accordance with the results of analysis, certain actions will be taken and relevant contingency plans will be reviewed or established adapt to the changes if necessary.

## Prevention and Preparedness

### 1. Implement firmly and effectively the functions and responsibilities of GCSEg.

This will be achieved by organizing, coordinating,

taking part actively in activities related to the civil protection, and cooperating well with relevant departments and agencies of either public or private sector. Furthermore, encouraging them to keep on improvement in reducing disasters and their impacts will be done as well.

## 2. Training

Different kinds of exercise carried out by departments individually or respectively are always encouraged so as to keep testing their capacities for responding to emergencies and monitoring how smooth their operations to be. In addition, a large-scale exercise with participants more than 830 from all departments and agencies included in the Civil Protection Framework is held by GCSEg annually.

Aims of the joint exercise are to test the communication between all participants as well as their capacities for dealing with emergencies, to monitor the entire operation within the framework and to make any appropriate improvement or change after reviewing.

## Emergency Response

### 1. Local Response Plan

As mentioned previously that Macao government always dedicates efforts to dealing with civil protection affairs. Except a series of laws concerning natural disasters have been established, a coordination office-GCSEg.- mainly dealing with the civil protection, including handling all kinds of disaster, was formed. It functions as a coordinator to communicate with all parties in regard to the concerned field and collaborate with them, to estimate and prepare all necessary resources required for disaster relief and emergency, to encourage them to establish any necessary measure/mechanism and activities for reducing disasters and their impacts, and so on.

### 2. Disaster Medical System

In accordance with the Civil Protection Framework, all hygiene departments and agencies in MSAR, including two hospitals, certain number of health centers of Health Bureau located in different areas of MSAR, Blood Donation Center and Red Cross of Macao, have been including in the framework to ensure medical services in case of the occurrence of any major emergency and disaster.

### 3. Search and Rescue

Some basic concepts and situations related with search and rescue are the composition of the Civil Protection Plan for Typhoon. In which, certain response measures and instructions are also included. Recently, GCSEg. is actively making a comprehensive review and analysis of all measures, equipments and mechanisms related to the search and rescue during the occurrence of any type of disasters and, making any respective reinforcement. As such, certain essential works are under proceeding, including contact with relevant departments and collaboration with them for the enhancement of equipments and mechanisms.

### 4. Budget

Although exact budget amount to reduce disasters and their impacts wasn't determined in MSAR, the government has never ignored to provide citizen with a safer living place and to reduce loss resulted from disasters. It spends large amount of money on improving Macao city's infrastructure projects every year, from which, particularly on improvement sanitation network and slope works for prevention of landslide and flooding (Table AI-8).

**Table A-8. Amount spent on improvement of major sanitation network and slope works from 2000 to 2007 (MOP Million)**

Year Improvement work	2000	2001	2002	2003	2004	2005	2006	2007
Sanitation Network	3.35	13.51	8.86	34.27	10.35	27.73	26.32	5.83
Slopes or hills	1.08	1.76	0.99	8.16	8.66	5.05	1.60	0.66

## Recovery and Rehabilitation

### 1. Community Assistance Grant Program

Macao government has always paid attention to citizen's life and property security. Therefore, government departments or private agencies will provide certain funding supports or accommodation and any other necessary help to victim of disaster in according to each case. On the hand, a program called Interest-free Loan Scheme for Building Maintenance provided by one of Macao government department is available for citizens in order to improve their security and quality of living.

### 2. Community Recovery

In spite of no large and severe disaster occurred in MSAR, the government has always made efforts to improving the citizen's security and quality of living. In this regard, certain large infrastructure programs, community reconstruction programs, other construction works related to the slope safety, coast protection and sanitation network development for better flood mitigation, and so on, are being executed by relevant government departments or have been included in Macao's development plan.

## Recent Major Disasters

### 1. Typhoon

Owing to the location of Macao, typhoon hit Macao frequently. It was fortunate that neither serious

damage nor great loss was caused. The success could be attributed to contributions and efforts made by the government departments and the private agencies. The development of disaster risk management, however, has to be implemented and reinforced constantly to cope with the rapid climate change and some other abnormal phenomena. Figure A-20 shows damages of typhoon in Macao in recent years. Although all damages are slight, the most concerned thing is that the typhoon "Neoguri" is the first storm to affect Macao in 2008 and also the earliest typhoon struck Macao over the past four decades. It is obvious that typhoon as well as other natural disasters will have great variation no matter in their intensity, pattern, impacts and so on. Therefore, it needs all governments to take deeply insight into them and take corresponding actions.



**Figure A-20. Photos of damages from typhoon in Macao in recent years**

## 2. Heavy Rain

Rainfall in Macao for the first half of year 2008 was very harsh. It is easily found from the Table A-9 shown as below that the Figure A-21 on rainstorm warning issued this year are much more than that issued last few years. Therefore, all governments also need to pay much more attention on this.



Figure A-21. Photos of damages from flooding in Macao in recent years

Table A-9. Figure on rainstorm warning issued in Macao in recent years

Date	Duration	Damages							
		Flood- ing	Tree	Sign- post	External wall of building	Scaf- olding	Awn- ing	Land- slip	Casu- alties
19-May-05	16H40-18H00								
26-May-05	21H22-22H10	5	1						
21-Jun-05	07H00-12H45	28	1		1		1	1	
03-May-06	00H42-02H00	3						1	
28-May-06	03H05-05H00	1							
31-May-06	04H30-05H30								
01-Jun-06	05H05-06H45								
02-Jun-06	10H30-14H00	3			1				
19-Jun-06	10H20-11H00				1				
09-Sep-06	05H15-06H00								
20-May-07	10H10-12H45	9							
10-Jun-07	02H55-04H00		5			3	1	1	
06-Jun-08	11H00-12H45	20	1					3	
07-Jun-08	18H00-20H50	5	2	1				2	
25-Jun-08	07H10-11H10		1	2		2	1		
28-Jun-08	16H28-17H30							1	
10-Jul-08	05H25-11H00		1					1	
11~12-Jul-08	22H20-02H23	1	1						







MALAYSIA

## Introduction

Although Malaysia is spared from the threats of severe natural disasters and calamities, it nonetheless experienced some form of disaster from flooding, man-made disaster, landslides and occurrences of haze pollutions. Malaysia experienced annual monsoonal flood which vary in term of severity and locations.

The flood that hit the southern States of Malaysia from middle December 2006 to early February 2007 was among the worst experienced by the country. The flood displaced more than 65,000 families and the economic loss was estimated at RM1.2 billion. This unfortunate incident led to the loss of 19 lives due to lack of awareness among the affected community.

In order to facilitate the management of disaster, the National Security Council is tasked to coordinate efforts among the various agencies involved in disaster management. Under the Directive No.20 of the National Security Council, when a severe disaster occurs meeting will be immediately convened by the Disaster Management and Relief Committee. A Disaster Control and Operation Centre will also be operated. The operation of the Disaster Control and Operation Centre will be established based on the disasters which could either be at the District, State or National level. Today, the NSC is taking steps by having meetings at regular intervals with the various agencies to further strengthen cooperation in disaster prevention and preparedness.

## Mitigation

Disasters have inflicted heavy cost in human, material and physical resources, and damage to the environment. They represent a potentially significant obstacle to economic growth and development. Thus the Malaysian Government has ensured the existence of a proactive, efficient and

effective natural disaster management system that includes preventive, mitigation, preparedness, response, rehabilitation and rebuilding components as well as education and training, partnership, public and civil awareness and international cooperation. At present, we have the National Security Directive No. 20 that encompasses the policy and mechanism on national relief and disaster assistance to advance national disaster management through effective coordination and integrated approach in the building of a culture of prevention and civil protection/public safety in the community.

### 1. National Disaster Management Strategy

The national disaster management strategy is to advance effective coordination and integrated approach in developing the culture of prevention and mitigation as well as providing safety for the community. The main components of the strategy are (i) reducing the risk of disaster through the continuous upgrading, development of disaster management capabilities in mitigation, preparedness, response and recovery processes as well as ensuring sustainable development; (ii) establishing a national approach to disaster management through coordinated and integrated system involving multi-agency and private sector including non-governmental organizations and civil society; (iii) developing and encouraging the participation in providing literature, education and training to enhance awareness and effective disaster handling among officials of various agencies and the community; (iv) developing a national approach to foster and enhance community awareness of risks, preparedness, response and recovery strategy through drills; (v) promoting and developing a concept of Total Defence as a mean to enhance Public Safety capability and resilience in response to threats of hazards and disasters; and (vi) promoting and developing international cooperation network through exchanging and sharing of information, experiences and best practices as well as training on dis-

aster management.

## 2. Activities

### ***LUPar Programme***

The purpose of LUPar is to provide general guidelines for policy makers, decision makers, national disaster managers, local authorities on the type of development to be allowed in hazard prone areas and to provide mitigation measures for the areas. The main goal for the LUPar programme is to encourage policy makers to apply the principles and practices of community based disaster management into their relevant Acts and legislations.

Malaysia is still in the phase of restructuring, reorganizing the disaster management system to fit in the Hyogo Framework for Action (HFA) that emphasize on disaster risk reduction. The framework has been adopted by Malaysia during the National Disaster and Relief Management Committee Meeting in November 2005.

Malaysia indeed has taken integrated development strategies especially for managing disaster risks, based on the development policy which focusing on socio-economic and environmentally friendly approach. The government has undertaken legislative and non-legislative measures such as hazard mapping, building codes that is earthquake resistance, amendments to Land Conservation Act 1960, amendments to Environmental Impact Assessment Rules 1987, and developing National Disaster Data and Information Management System (NADDI) to assist in decision making and national planning on disaster risk reduction.

### ***Structural Designs for Flood Mitigation***

Structural mitigation measures in both engineered and non-engineered structures are implemented to minimise flood, such as the Stormwater Management and Road Tunnel (SMART) system and Flood Mitigation Project of MSC (Multimedia Super Corri-

dor), Batu Jinjang Pond And Related Diversion Projects in Kuala Lumpur as well as the Flood Mitigation Project of Sungai Muda and Bertam/Kepala Batas in Kedah.

### ***Enhance Public Education and Awareness***

The Government of Malaysia is committed to develop programmes to enhance public awareness on disaster preparedness. The Malaysian government conducted public education program on disasters prevention to people living in flood prone areas with the objectives of protecting human lives and property; minimizing or to avoid social disruption and economic losses. Public education and awareness programmes are also carried out through various media including TV and radio broadcasts.

Among the programmes and activities that have been implemented to enhance public awareness are as follow: (i) dissemination of information on hazards and warnings to the public through pamphlets and mass media; (ii) "roadshow" on disaster awareness and management at the State and district levels; and (iii) celebration of the annual :National Disaster Awareness Day" on 26 December.

## 3. Addition of Early Warning System Facilities

The disaster early warning centers and operation Rooms at the Federal, State and District levels are being equipped with the up to date and appropriate equipment, communication facilities and disaster management system for the efficiency in the monitoring and timely delivering of early warnings of impending disasters, relaying information to various agencies, response coordination and decision making.

### ***Government Integrated Radio Network (GIRN)***

The Government has recently introduced an integrated radio network project. This project will pro-

# Disaster Management System

vide secure digital trunk radio system for the various government agencies involved in disaster management.

## ***Fixed Line Alert System (FLAS)***

Other than the dissemination of early warning message through SMS and mass media, the fixed line alert system (FLAS) or disaster alert system (DAS) will enable the government to disseminate early warning messages to selected community via land line provided by Telekom Malaysia Berhad (TM). Although the system is developed for tsunami warning, it will be able to incorporate early warnings for other type of disasters. The system provides short and precise messages to the targeted community which can be operated on a daily basis.

## **Preparedness and Training**

Malaysia recognized that a fundamental prerequisite for disaster preparedness is an effective and well-functioning early warning system, capable of delivering accurate information to the population at risk, dependably and in a timely manner. There is also a need to cooperate, at international and national levels, in the identification, assessment and monitoring of disaster risks and the provision of early warnings.

Malaysia strives to continually upgrade its monitoring and forecasting capabilities by expanding its observational network, exploring new technologies and strengthening cooperation with other agencies. Frequent constructive discussions and consultations among the members of the national disaster committee contribute significantly to the establishment of new regulations and procedures which will help to improve existing systems and infrastructures for preventing and mitigating disasters.

## **1. Continuity of Operations Program**

Continuity of Operations Program includes the activities of individual departments and agencies and their sub compartments to ensure that their essential functions are performed in the event of an emergency.

## **2. Disaster Management Exercise**

Exercises are carried out to ensure high level of responsiveness among the relevant agencies involved in disaster management in areas such as decision-making and implementation of procedures and guidelines. These exercises help to strengthen cooperation and to consolidate effort in multi-agency tasking. Some of the exercises held are as follows: (i) disaster and crisis management exercise in various field; (ii) nuclear, biological and chemical exercise; (iii) influenza pandemic simulation exercise; and (iv) tsunami emergency drill.

## **3. Training**

Training activities are organized at national and states level to cater for Social Welfare Officers and volunteers to work in disaster management. The Department of Social Welfare also organised special workshop in disaster management for national level. Other training modules include working at multi disciplines level, disaster technical management, rehabilitation and other issues related to disaster management. The objectives of the training are to provide knowledge and skills for officers and volunteers to work professionally in helping the disaster victims.

## **Response**

Disaster management is a complex series of activities which include risk assessment, prevention

measures, and preparedness to cope with future disasters, emergency response to a disaster, recovery and rehabilitation. Thus in Malaysia, the National Security Division of the Prime Minister Department is appointed as the guardian and coordinating body for disaster management.

Malaysia realizes that each disaster has unique circumstances and the response needs to be tailored to meet the specifics of the situation but the general areas requiring response include: (i) search and rescue for finding those who may be trapped by building collapse or lost at sea due to ship wreck; (ii) assessment of needs for working out what is required, in what quantities, and for whom Health - provision of medical care and preventing the spread of disease through immunisation, provision of safe water and food, waste disposal and burial of the dead; (iii) basic needs for procuring and distributing food, shelter and clothing; (iv) gender for understanding the roles of men and women in families and communities to identify needs and ensure fair distribution of resources; (v) livelihood and economy for assisting people to earn a living to help them recover; (vi) emotional support for counselling and reuniting separated families; (vii) logistics for transportation of people and equipment; (viii) finance for obtaining, allocating and accounting for money; (ix) communication for media coverage, information for families, fundraising; and (x) infrastructure for rebuilding damaged infrastructures such as bridges, roads, electricity, telephones, water pipelines, waste disposal systems

The local authorities may not have the resources necessary to meet the demands of a large scale disaster but the survivors and people living in the area will have to make do with the limited resources available before assistance from federal agencies arrives. The emergency response needs to be coordinated for the survival of the maximum possible number of victims.

Some of the issues to be considered in the

response are: meeting survival needs (eg. types of food, clothing, shelter); limiting the effects of aid on the local economy and capacity building; prioritising the distribution of limited supplies; and gaining funding for long term development and disaster preparedness rather than just responding to emergency situations. In the chaos of a disaster, making quick decisions is vital to ensure that sufficient and prompt aid is provided to the victims to lessen their sufferings.

The effectiveness of the response also lies in education. Educating the public on the risks and dangers of natural disasters is very important. Once the society understands the risks and dangers they will not take disasters lightly. The disaster victims or even potential victims will be able to follow instructions more willingly from the authorities such as evacuation for people living precariously on landslide-prone areas.

The government hopes to create increased awareness among Malaysians so that they are constantly prepared and proactive in facing and overcoming natural disasters. Thus the Malaysian government has declared December 26 as National Disaster Awareness Day.

## 1. National Response Plan

Under the Directive No. 20, whenever a severe disaster occurs, meeting at district, state or national levels, will be immediately convened by the Disaster Management and Relief Committee. A Disaster Control and Operation Centre will also be operationalized. The operation of the Disaster Control and Operation Centre will be established based on the disasters which could either be at the District, State or National level. Today, the NSC is taking steps by having meetings at regular intervals with the various agencies to further strengthen cooperation in disaster prevention and preparedness.

# Disaster Management System

## 2. Emergency Response Support

Management of disaster as stipulated in the Standard Operational Procedures involves various government agencies and NGOs, base on respective tasks and responsibilities of the agencies. The Department of Social Welfare has the roles and responsibilities such as management of evacuation centers; assistance in the form of food, clothing and other necessities; registration of victims; and guidance and counseling. On top of that the department also will continue to assist the families those are seriously affected by disaster in order to help them to return to their normal daily life. This is considered as a long-term intervention or management process

In preparation for the natural disasters including that related to tropical storms/typhoons, the Department of Social Welfare has identified suitable relief centers throughout the country for the victims when necessary. On top of that the department also set up ration storage centers at strategic places to supply food and other necessities for the victims at the relief centers

Annually, in preparation for the impending flood disasters during the northeast monsoon or northern hemisphere winter monsoon season, the Department of Social Welfare has identified more than 4,500 suitable relief centers that can accommodate more than 1.3 million victims throughout the country when necessary. On top of that the department also set up more than 590 ration storage centers at strategic places to supply food and other necessities for the victims at the relief centers

The victims of natural disasters are placed at the relief centers managed by Social Welfare Officers with the help of National Welfare Brigade as volunteers. During their stay in the relief centers, victims with emotional problem will be assisted by Counsellors. The government is also prepared to provide mobile emergency support to the victims when the need arises.

## 3. National Disaster Medical System

The relevant government medical agencies are prepared to provide medical response to major emergencies and nationally declared disasters. Victims with emotional problem would also be assisted.

## 4. Search and Rescue

The search and rescue teams are available for rapid deployment to assist in locating, rescue (extrication) and provide initial medical assistance to the victims trapped in remote and confined spaces.

## 5. Budget on national level

Annual regular budget is allocated to provide temporary relief, such as food and shelters to the victims of disasters, as well as to improve infrastructure for disaster prevention and counter measures and for research and development in disaster risk mitigation area and enhancing the National Disaster Management System.

## Recovery

An emphasis on good development and community preparedness can reduce the impact of disasters especially for the most vulnerable people living in hazard prone areas with few financial resources to help them recover after having lost their savings and their means of livelihood.

## 1. Community Assistance Programs Activated By a Disaster Declaration

### 1.1 Public Assistance Grant Program

The federal and state governments are to provide assistance to local governments and non-govern-



mental organizations to assist the communities quickly respond to and recover from major disasters or emergencies.

## 1.2 Hazard Mitigation Grant Program

The federal and state government provides allocations to local governments to implement long-term hazard mitigation measures so as to reduce the loss of life and property.

## Resources

### 1. Human Physical and Financial Resources

The government ensures that adequate human, physical and financial resources on disaster management are available to protect the environmental as well as to carry out programs related to disaster response and recovery, hazard mitigation, and emergency preparedness.

The automated flood alerting and information dissemination system of InfoBanjir using Short Message System (SMS) which was initially meant only for DID flood operation managers, was now being expanded to include flood relief officers of other related agencies e.g. Malaysian Meteorological Department, Police, Army, State Public Defence Department etc. It is aimed at providing early warning and response action in flood operation.

In addition, a SMS flood warning system and services (SMSFWS) was developed and operated for the Damansara River basin, Selangor (a major tributary of Klang River) after a major flash flood hit the area on 26 February 2006. The system is designed to provide warning to the local residence of an impending flood event via “bulk SMS broadcasting” services to personal hand phones. This is on top of the flood warning sirens provided in the designated areas. It is aimed at providing early warning to the local resident on the impending flood occurrence in the vicinity of TTDI

Jaya, Shah Alam and surrounding areas which are affected by the flood water from the swelling Sungai Damansara. This shall allow them more lead time to take appropriate preparatory action to prevent loss of life and minimize property damages. The system has been working and proven effective so far.

## 2. Websites

The Department of Irrigation and Drainage Malaysia (DID), responsible for providing flood forecasting and warning service to the public, has established an Internet-based National Flood Monitoring System known as Infobanjir (<http://infobanjir.moa.my>), which includes rainfall and water level data collected for the whole country. The government has been working closely with the Canadian government to establish the GEOREX Monsoon Flood System for the Kelantan River Basin, a flood monitoring system integrating remote sensing, hydrological model and geographical information systems (GIS). This system allows the merging of hydrological data, such as river water levels and potential flooded areas, with geographical data on demography and transportation infrastructure.

While Malaysian Meteorological Department (MMD) is the sole agency tasked with the responsibility of monitoring weather and seismological activities in the country. For MMD, preventing and mitigating natural disasters is a top priority. It strives to continually upgrade its monitoring and forecasting capabilities by expanding its observational network, exploring new technologies and strengthening cooperation with other agencies. Information on severe weather and tsunami warnings as well as other weather information and earthquake events can be assessed through its website <http://www.met.gov.my>.





PHILIPPINES

## Introduction

The Philippines is very vulnerable to natural disasters which the natural geographical and physical setting places the country at the center of typhoon, tectonic and volcanic belts. As a consequence of typhoons and even ordinary monsoon rain, flooding is very common in both urban and rural areas. The National Mapping Resource and Information Agency said that one hundred and two areas in the Philippines are in danger of being submerged by flood waters. This is compounded by socio-economic vulnerability where the majority of the people remain in a poverty situation.

The December 2004 flashfloods that affected Quezon and Aurora Provinces of eastern Luzon Island resulted to severe flooding and landslides and led the unusually high death toll as well as extraordinary damage to both public and private properties. The OCD as the implementing arm and Secretariat of the NDCC immediately implemented the Four Point Action Plan for Disaster Preparedness to increase public awareness and involvement in measures put in place by government to minimize the impact of similar disasters in the future.

### 1. Organizations of the National Emergency Management Agency

The Philippines has administrative divisions such as 17 regional disaster coordinating councils; 79 provincial disaster coordinating councils; 113 city disaster coordinating councils; 1,496 municipal disaster coordinating councils; and 41,956 barangay disaster coordinating councils which barangay is the smallest political unit. The Philippines has 17 administrative regions. Also, the Philippines has a well established institutional and legal framework for disaster management.

The National Disaster Coordinating Council (NDCC)

takes the lead, with local coordinating councils established at the various levels. There are a number of laws that govern disaster management concerns. In line with the constitutional mandate encouraging the participation of nongovernmental organizations in development, there are adequate provisions which enable the nongovernmental organizations to participate in various government program and activities. It advises the President on matters related to natural calamities and disasters, including recommendations for the declaration of State of Calamity in disaster-affected areas. In each local government unit (province, city or municipality), the local DCC is headed by the elected chief executive, such as governor or mayor. Thus, disaster management is imbedded deeply into the democratic governance in the Philippines.

## Disaster Management system

### 1. Presidential Decree No. 1566

The government body that is mainly responsible for disaster management is the National Disaster Coordinating Council (NDCC), composed of 14 government departments, the Office of the President, the Armed Forces of the Philippines and the Philippine National Red Cross. The Council was established in 1978 through Presidential Decree No.1566, "Strengthening the Philippine Disaster Control Capability and Establishing the National Program on Community Disaster Preparedness."

The Council is headed by the Secretary of the Department of National Defense (DND) as Chairman, while the Administrator of the Office of Civil Defense of the DND serves as the Administrator and Secretariat. The NDCC is mandated to i) Prepare a national disaster preparedness plan, organize disaster coordinating councils at the local level, develop self-reliance among the Local Government Units (LGUs), and advise the president on the national disaster preparedness program, opera-

tions and rehabilitation efforts (Brown, Amadore and Torrente, 1991:218).

The two key problems of the NDCC are inadequate funding and the lack of executor provisions, preventing the Council from conducting policy studies on disaster management (Pilar, 1989, cited by Brown, Amadore and Torrente, 1991: 219-220). The NDCC Chairman can “convene the Council as often as necessary to effectively coordinate the national efforts on disaster preparedness emergency operations and rehabilitation activities; and call on all other departments, bureaus, agencies, instrumentalities and cooperation of the government and the private sector for assistance in preparing for, reacting to and recovering from the effects of disaster and civil emergencies”(Presidential Decree No.1566).

At the local level, the local Disaster Coordinating Councils (DCCs) are usually active in those provinces, cities and municipalities that are very vulnerable to disasters. In other LGUs, the DCCs become active only when a disaster hits the area. The need to focus more on the prevention, mitigation and preparedness aspects of disaster management has been noted. In fact, there was a proposal to change the name of the NDCC to National Disaster Response Coordinating Councils. But this can be made possible only through legislation since the NDCC was established by Presidential Decree.

## 2. The 1991 Local Government Code

A significant piece legislation that affected the system of local governance is the 1991 Local Government Code which granted LGUs more powers, authority, responsibilities and resources. The Code devolves the provision of basic services from the national government to the LGUs, such as agricultural extension and on-site research, community-based forestry projects, public works and infrastruc-

ture funded out of local funds, health and hospital services, school building, social welfare services, tourism facilities, promotion and development, telecommunication services and housing.

Regulatory powers were also devolved such as reclassification of agricultural lands, enforcement of environmental laws, inspections of food products, quarantine, enforcement of the National Building Code, and the processing and approval of subdivision plans. The Code put meat to the state policy of the 1987 constitution, which stipulates that “The State shall encourage non-governmental, community-based, or sectoral organizations that promote the welfare of the nation” (Article II, Section 23, Philippine Constitution).

Given this, the Code mandated the membership of non-governmental organizations in local bodies such as the Local Development Councils, local school boards, local health boards and local peace and order councils. The LGU may also provide financial assistance or other forms of assistance to people’s organizations and nongovernmental organizations for economic, socially-oriented, environmental or cultural projects. Furthermore, people’s empowerment is recognized through mandatory consultation and public hearings, and people’s initiatives for the recall of elected officials and conduct of referendum ( Nolloedo, 1991).

## 3. Other Environmental Laws

The Philippines has several laws which, if properly implemented, can prevent and mitigate the occurrence of disasters. Among these are the following as: (i) National Integrated Protected Areas Systems Act of 1992 (RA 7586) which provides for the establishment and management of national protected areas systems. (ii) The Philippines Fisheries Code of 1998 (RA 8550) which stipulates the State’s policy in fisheries, namely achieving food security, limiting access to fishery resources for the exclusive use

## Disaster Management System

and enjoyment of Filipinos, protecting the rights of and giving priority to municipal fisherfolk, and providing technical and other support to fisherfolk. (iii) The Philippine Environmental Impact Statement or EIS System promulgated by Presidential Decree No.1586, issued in 1978. The EIS System requires an Environmental Compliance Certificate (ECC) for environmentally critical projects (ECPs) and projects in environmentally critical areas (ECAs). (iv) The National Building Code (RA 6541 of 1972 as revised by Presidential Decree No. 1096 (1977) which specifies the minimum requirements and standards for building designs and construction. Under the local government legislative system, the local councils, from the provinces, cities, municipalities and barangays, can enact ordinances to ensure the welfare and protection of the people. The barangay is a village or a community which is also the smallest Local Government Unit. (LGU). It has a Barangay Council composed of elected officials such as the Chairperson and six councilpersons. It receives an annual budget from the national government; (v) The National Anti-Poverty Commission (NAPC) was composed by the government when President Estrada assumed office in 1998 which 14 commissioners each representing the 14 basic sectors (farmers, workers, indigenous Filipinos, women, and so on), including the victims of disasters and calamity sector (VDC) were included. The NAPC is under the Office of the President. The representatives are from non-governmental and people's organizations. Local NAPCs at the regional and provincial levels have also been established to enable the non-governmental groups to participate in the government programs.

### National Agencies related to Disaster Management

#### 1. Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Established in 1972 through Presidential Decree

No.78, PAGASA is mandated to implement the state policy of protecting the people against natural hazards and ensuring the safety, well-being and economic security of the population. PAGASA is involved in the detection, monitoring and timely issuance of typhoon warnings. Weather bulletins are reported daily to the public through the existing mass media facilities (see Brown, Amadore and Torrente, 1991).

#### 2. Philippine Institute of Volcanology and Seismology (PHIVOLCS)

Now physically based at the University of the Philippines in Diliman, PHIVOLCS is under the Department of Science and Technology. It operates the seismological and volcanological networks in the country. The mandate for PHILVOLCS is as follows (Brown, Amadore and Torrente, 1991): (i) Mitigating hazards of volcanic activities through appropriate detection, forecasting and warning systems; (ii) Formulating appropriate disaster preparedness plans; (iii) Predicting the occurrence of volcanic eruptions and earthquakes, and their geotectonic phenomena; (iv) Determining how eruptions and earthquakes will occur and areas likely to be affected; and (v) Exploiting the positive aspects data of volcanoes and volcanic terrain to enhance the socio-economic development efforts of government.

#### 3. Housing and Land Use Regulatory Board (HLURB)

The HLURB is a quasi-judicial government agency responsible for regulating the implementation of policies related to housing and land use standards. It produces guidelines for formulating comprehensive development plans, land use plans and zoning ordinances.



## Emergency Response

### 1. Pre-Disaster Phase

There are eight activities in the pre-disaster phase following as: (i) planning for disaster for development and formulation of Disaster Management Plan (DMP); (ii) organizing for the organization of DCCs in accordance with the DCC structure set forth in the NCDPP; (iii) training to conduct of training on disaster management for DCC members; (iv) drills to conduct of organizational and community drills/exercises periodically; (v) stockpiling for the predetermination of food, clothing, shelter, medical supplies, transportation and other emergency requirements; (vi) resource data canvassing for the identification of existing resources, evaluation of capability resources organization to carry out disaster-related tasks and allocation of suitable roles for resource organization; (vii) public information/awareness campaign in coping with disaster situations in accordance with the office of Civil Defense, Philippine Information Agency well as other government or private entities with facilities for dissemination of information; (viii) communications and warning activities for the organization of warning units in the province, establishment of warning system that must be clearly defined and written down in plans, standard operating procedures and other relevant documents, inform concerned officials and agencies in the province as well as the general public of the warning system.

### 2. Emergency Phase

Mobilizes all emergency services of the DOC namely rescue and engineering, evacuation, first aid, medical services, emergency relief, public and fire auxiliary, transportation and survey/conduct damage assessment with the national government supporting efforts.

### 3. Post Emergency Phase

Cross-checking of data of damage report with pre-emergency data obtained to facilitate the location or whereabouts of persons and to assess available community resources for rehabilitation purposes. This phase will also determine the nature of extent of rehabilitation efforts to be undertaken and request of assistance from appropriate government agencies, private offices/agencies or individual, if the situation goes beyond the capability of the PDCC.

## Disaster Management Plan

The NDCC has a Calamities and Disaster Preparedness Plan which spells out the functions of each member agency in times of disasters. Under the system, various service committees may be convened during disaster situation. These Inter-Agency Committees have the following functions as: (i) early warning service to provide fast and adequate reliable warning system in time of impending calamity; (ii) communication and transport service to provide, operate, and maintain continuous and adequate reliable communication and available transport facilities throughout the period of disaster; (iii) evacuation service to evacuate the populace and properties systematically in case calamity arises; (iv) rescue and engineering service to remove victims and casualties from areas affected by disaster and undertakes emergency repair of damaged infrastructure, utilities and facilities; (v) health service to protect life through health and medical care of the populace and minimize casualties through proper information and mobilization of all medical resources; (vi) relief and rehabilitation service to minimize human suffering and provides adequate restoration program and service for ensuring the normal functioning of individuals affected by disaster; (vii) public information service to provide the civilian population simple/accurate/relevant and timely information and instruction arising from nat-

## Disaster Management System

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ural or man-made disasters; and (x) rehabilitation service to provide rapid restoration of the morale of persons affected by disaster.

### Resources

Under the General Appropriations Act for CY 2005, P 700 M was allocated as National Calamity Fund (NCF) for aid relief and rehabilitation services to

communities /areas affected by man-made and natural calamities, and repair and reconstruction of permanent structures, including other capital expenditures for disaster operation and rehabilitation activities. Release from this Fund shall be made directly to the implementing agencies and or local government units in accordance with the recommendation of the National Disaster Coordinating Council and upon approval of the President of the Philippines.



REPUBLIC OF KOREA

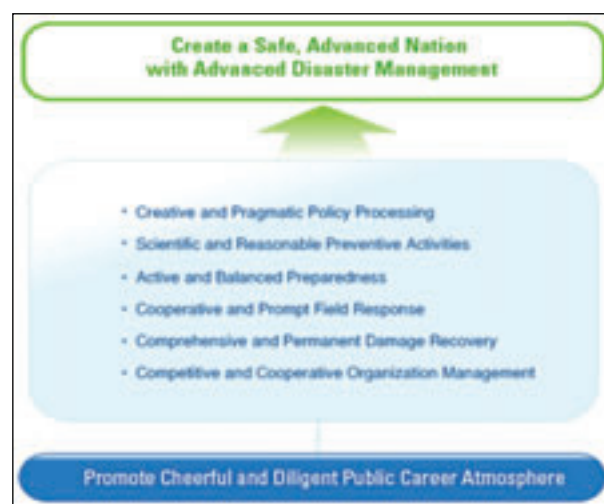
## Introduction

Administrative divisions in disaster management system of Republic of Korea have 9 provinces and 7 metropolitan cities. Laws related with natural disasters include the Natural Disaster Countermeasures Act, Act on Countermeasures against Agricultural and Fishery Disasters, Disaster Relief Act, etc. The Natural Disaster Countermeasures Act (enacted in 1995) prescribes control of and countermeasures against natural disasters such as torrential rain and typhoons, investigations of relevant damage, rehabilitation costs, etc. The Act on Countermeasures against Agricultural and Fishery Disasters (also enacted in 1995) stipulates measures concerning prevention of and countermeasures against disasters affecting agriculture and fishery such as damage from disease, harmful pests and drought. The Disaster Relief Act (enacted in 1962) provides for relief of victims of natural disasters or calamities, etc. From June 1, 2004 the Disaster and Safety Management Basic Law is enacted designating disaster management competent organizations based on the disaster definition, identifying the Central Safety Management Committee, establishing rapid information dissemination system, and enhancing disaster-related research functions. Water resources and land use planning are managed by the Ministry of Land, Transport and Maritime Affairs. Health, environment, education, and finance are managed by the Ministry of Health, Welfare, and Family Affairs, Ministry of Environment, and Ministry of Strategy and Finance, respectively.

### 1. Organizations of the National Emergency Management Agency

The National Emergency Management Agency (NEMA) under the Ministry of Public Administration and Security (MOPAS) manages overall measures to counter natural disasters in Korea with administrative policy shown in Figure A-22. The agency is

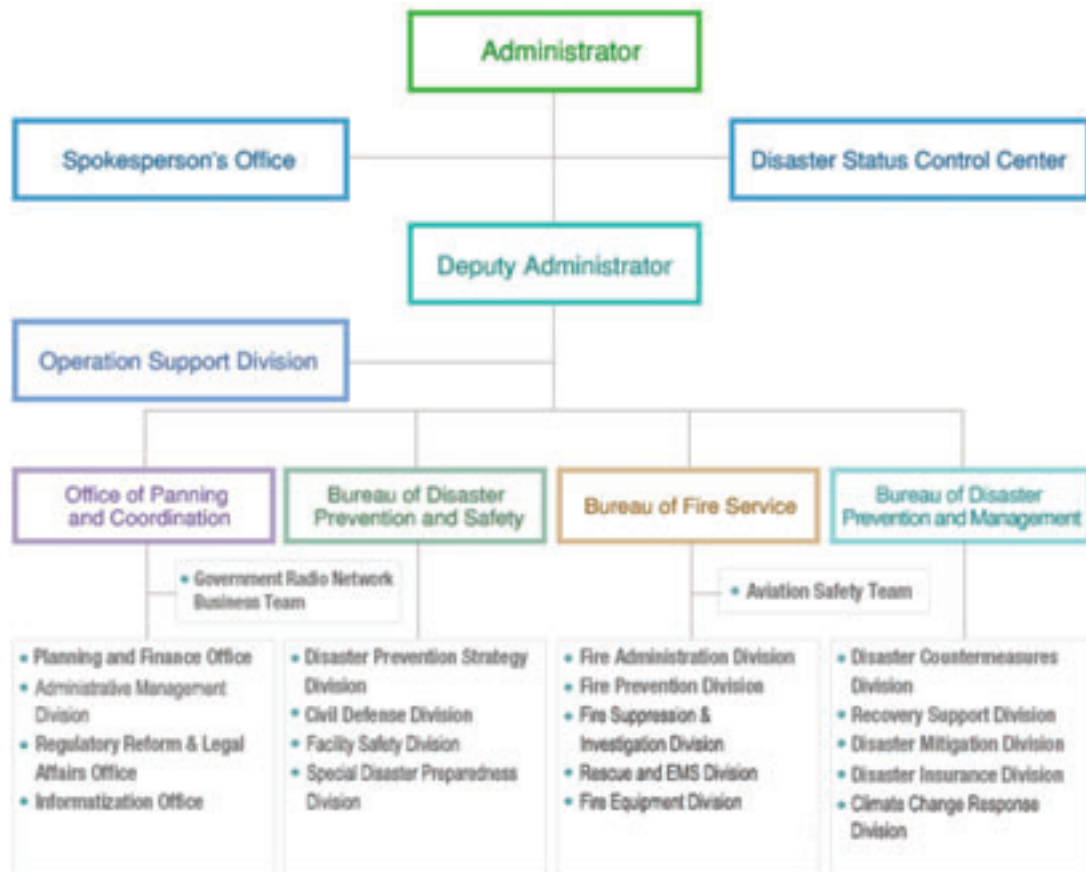
composed of one Office of Planning and Coordination and three Bureaus, i.e., Bureau of Disaster Prevention and Safety, Bureau of Fire Service, and Bureau of Disaster Prevention and Management. On June 1, 2008 NEMA restructured its previous organization shown in Figure A-23 to cope with rapidly changing disaster environment and to execute necessary measures against emerging disasters more effectively. NEMA takes responsibility for practical affairs for regular period. When a disaster strikes, an ad hoc organization called CDSCH forms. The Central Disaster and Safety Countermeasures Headquarters (CDSCH) is in charge of prevention and status control of natural disasters, as well as recovery planning, and executes necessary measures related to such disasters. The Minister of the MOPAS heads the CDSCH while Director of NEMA serves as its vice-chief. Twenty-three personnel from 21 government organizations serve on its council. Also, the Central Safety Management Committee serves the function of providing coordination and support for the CDSCH, and the Central Emergency Rescue Control Squad supports CDSCH when a massive search and rescue service is required.



**Figure A-22. The administrative policy of The National Emergency Management Agency**

There are three affiliated organization such as National Fire Service Academy, National Disaster Management Institute, National Institute for Disaster Prevention, National 119 Rescue Service in NEMA. The NEMA consists of 1 officer, 3 bureaus, 19 divisions and 4 affiliated organizations. A total of 435 people (267 for the main office and 168 for the

affiliated organizations) works for the NEMA. Through the execution of 12 laws including the Disaster and Safety Management Basic Law, it is taking the lead in the national disaster management work of protecting the lives and property of the people.



**Figure A-23. The organization diagram of The National Emergency Management Agency**

The NEMA has main functions for disaster management such as mitigation and planning, response, and recovery. For the mitigation and planning, NEMA works for (i) establishment of national safety management plans and operation of the National Safety Management Committee; (ii) establishment of civil defense drill plans, guidance, comprehensive steps designed to ensure safety from fires and safety management of dangerous substance facilities; and (iii) refurbishing facilities

under special surveillance, cultivating safety awareness campaigns, education and publicity activities. For the response on disaster, NEMA works for (i) establishing the Incident Command System (ICS) regarding emergency disasters, management, and research of fire services deployment; (ii) warning against fires, fire drills, rescue operations, rescue technology guides and operation of voluntary fire-fighting corps; and (iii) operation of the National Emergency Rescue Control Center, management of

## Disaster Management System

firefighting facilities and apparatus standards. In the sector of recovery of damages, NEMA works for (i) operation of the National Disaster and Safety Countermeasure Headquarters (NDSCH) and the Central Settlement Support Corps, and emergency declarations; (ii) recovery of disaster-hit areas, damage surveys and analysis of causes and declaration of special disaster zones; and (iii) fostering disaster prevention industries and relevant technologies, renovating small streams and making area safety assessments

### 2. Detailed functions of organizations

Disaster Status Control Center works for preparing of the disaster situation room and analyzing information on disaster damage. Innovation and Personnel Officer works for reformation of administration managing the organization and allocating personnel. Public Information Officer works for disseminating information to the public on disaster prevention works conducted by NEMA. Planning and Budget Officer works for drafting important pieces of work, readjustment, budgeting and business related with parliament. The officer is also in charge of legal and international affairs and other activities related to overall planning and readjustment of operation plans. Information and Communication Officer works for planning businesses related to information and readjustment of planning businesses. The officer is in charge of the operation of the National Disaster Management System and the disaster prevention portal site. Mitigation and Planning Division works for making draft of civil defense & disaster prevention policies and planning policies for national and regional safety management. Civil Defense Planning Division makes plan for civil defense matters as well as guidance and supervision and investigates damages caused by civil defense activities. Fire Administration Division works for general things related in fire service legal matters and draft and legislation of fire service and research on the fire service and its

operation. Technological Disaster Management Division legislates against for integrated plans on man-made disasters. Public Cooperation Division works for citizen participation in safety programs and the development of education and public relations programs for distribution. Response Planning Division works for overall planning on fire service personnel system and its research. Fire Suppression Division makes plans for putting out fires and investigation as to the cause of fires and renovating laws on voluntary firefighters and full-time firefighters. Rescue Division works for legislating matters related to disaster rescue and relief and setting up emergency rescue system which businesses are related to the National 119 Rescue Service and Fire Aviation operation. Facilities and Equipment Division works for overall planning for fire service facilities and their standards. Preparedness Division works for making of draft laws related to natural disasters and its planning and coordination. Recovery Division works for overall plan for disaster recovery and relief for disaster victims and recovery work. They organize and operate the national joint inspection team to survey disaster damage. Technical Support Division works for setting up policies related to safe management of disasters. Assessment Division works for overall readjustment of evaluation of disaster management and the operation of the Disaster Impact Assessment System. General Services Division provides supports to NEMA employees so that they can devote themselves to saving lives and protecting property taking care of the employee's welfare matters and executing the budget among other things.

### 3. Priorities on disaster risk management

1) It is required to strengthening close cooperation in the region. It is desirable to have several practical cooperation programs and training that can yield ready-to-use outputs. Programs provided by ADPC, ADRC and other international or regional organiza-



tions need to be more actively developed and publicized.

2) Even when the government prepares perfect policies or organizations to reduce disaster losses, the government cannot do it alone without active participation of citizens. More public education and participation are desired. Programs to increase public awareness should be discussed as one of the top priorities in the WCDR.

3) Sustainable development can be defined as development that does not increase disaster potential or vulnerability. However, it is almost impossible to develop any area without disturbance. To reduce disaster factors due to development, regulations that safeguard not only developing site but also downstream should be discussed during the WCDR. The Disaster Impact Assessment system, which is currently put in force in Korea and actually reduce disaster factors, can be a good example for implementing sustainable development.

4) Budget for disaster reduction project is sometimes considered as a simple cost, not an investment. Methodology or strategy that can change the concept and increase disaster reduction budget needs to be addressed.

## Mitigation

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. This is achieved through risk analysis, which results in information that provides a foundation for mitigation activities that reduce risk, and flood insurance that protects financial investment. Wind storm, typhoon, flood, drought, heavy snow, extreme temperature, slide, wild fire, storm surge, yellow dust, etc. (not in severity order).

### 1. Risk Analysis

Government agencies must understand the full impact of natural hazards using applied multi-haz-

ard engineering science and advanced technology in order to effectively plan of followings to reduce natural hazard effects.

- Flood Hazard Mapping
- National Dam Safety Program
- National Hurricane Program
- Mitigation Planning

### 2. Risk Reduction

The goal of risk reduction is to reduce the risk to life and property, which includes existing structures and future construction, in the pre and post-disaster environments. This is achieved through regulations, local ordinances, land use and building practices, and Mitigation projects that reduce or eliminate long-term risk from hazards and their effects.

- Mitigation Grant Programs
- Floodplain Management
- National Earthquake Hazards Reduction Program (NEHRP)
- National Hurricane Program
- National Dam Safety Program

### 3. Flood Insurance

The National Flood Insurance Program (NFIP) goal is to reduce the impact of flooding on private and public structures by providing affordable insurance for property owners. The program encourages communities to adopt and enforce floodplain management regulations, which will mitigate the effects of flooding on new and improved structures.

### 4. Mitigation's Value to Society

Mitigation is valuable to society in these ways: It creates safer communities by reducing loss of life and property damage.

## 5. Mitigation Best Practices Portfolio

Best Practices Portfolio is a collection of ideas for activities, projects, and potential funding sources that can help reduce or prevent the impacts of disasters. By sharing your first-hand experience of damaged areas, you help spread the word of how important, effective, and life-saving mitigation can be. Stories that focus on successful mitigation projects and practices implemented after a disaster may encourage communities and individuals to implement new mitigation efforts to prevent future damages.

Use the Online Submission tool or download the Submission Worksheet to help you capture key elements to draft and submit new stories. Our goal is to find examples that highlight a variety of hazards, mitigation actions, funding sources, and Best Practice subjects. We encourage you to enhance your story by including up to two related website links and as many as six supporting files (e.g., photographs, documents, PDFs, maps).

## Preparedness and Training

### 1. Continuity of Operations Program

Continuity of Operations Program includes the activities of individual departments and agencies and their sub compartments to ensure that their essential functions are performed in the event of an emergency

### 2. National Preparedness Guidelines

The NEMA published the National Preparedness Guidelines to organize and synchronize national efforts to strengthen preparedness which establish a vision for national preparedness and provide a systematic approach for prioritizing preparedness efforts across the Nation. The National Prepared-

ness Guidelines is the culmination of extensive efforts to define the specific plans and capabilities in order to address catastrophic threats. This document will help focus policy, planning and investments at all levels of government and the private sector in order to strengthen our collective capabilities and better prepare for major incidents. There are four critical elements to the National Preparedness Guidelines: (i) The national preparedness vision, which provides a concise statement of the core preparedness goal for the nation. (ii) The National Planning Scenarios, which collectively depict the broad range of natural and man-made threats facing our nation and guide overall homeland security planning efforts at all levels of government and with the private sector. They form the basis for national planning, training, investments and exercises needed to prepare for emergencies of all types. (iii) Universal Task List (UTL), which is a menu of some unique tasks that can facilitate efforts to prevent, protect against, respond to and recover from the major events that are represented by the National Planning Scenarios.

### 3. Training

There are 52 training courses for three major topics on national security, for man-made disaster, and for the natural disaster. Trainings are preformed in three main fields such as civil defense, disaster security and preparedness, and life safety to the target of various persons including public officers. Trainings courses on national security are to prepare for substantial terror threats spreading around the world and enforce proactive national security management against North Korea. Trainings related in man-made disaster are for the alert daily safety awareness and enhance the national awareness and focus on disaster prevention by establishing systematic risk management. Trainings related in natural disaster are for management methods deal with natural disaster and emergencies caused by climatic changes.

## 4. Basic Disaster Prevention Plan

To cope with disasters which are taking more diverse forms and larger in scale and to define basic guidelines for the national disaster prevention policy, the government has formulated the sixth Basic Disaster Prevention Plan Period (2002-2006) in which "Establishment of Disaster Resistant Country" is employed as the policy concept.

From February to April each year, disaster prevention training and education programs are provided to working-level government employees in charge of disaster prevention in each province, city, county and district. With the period from the beginning of March to the end of May designated as the period of preparedness against possible disasters, disaster prevention facilities are inspected and repaired at the level of each administrative unit including province, city, county and district in a precautionary measure against disasters. During the period from March to May every year, disaster prevention training including mapping and computerized exercises along with training based on regional characteristics is carried out concurrently with civil defense drills on the basis of a simulated massive natural disaster comparable to those which actually occurred in the past.

## Emergency Response

### 1. National Response Plan

Basics for how the government coordinates with local and tribal governments and the private sector during incidents.

### 2. Mobile Emergency Response Support

Basics for how government coordinates with local governments and the private sector during incidents.

## 3. National Disaster Medical System

The NDMS supports government agencies in the management and coordination of the national medical response to major emergencies and nationally declared disasters.

## 4. Urban Search and Rescue

US&R teams are spread out across the country and available for rapid deployment to assist in the location, rescue (extrication), and initial medical stabilization of victims trapped in confined spaces.

## 5. Budget size on national level

Annual regular budget for NEMA is about \$300 million. Also, several national level projects are funded. For instance, in 2003, for mountain and river control projects such as dam development, small river creeks improvement, about \$2 billion was invested in 8 projects. 13 Projects were developed in disaster prevention and countermeasures and \$1 billion was spent. For research and development in disaster risk mitigation area \$50 million was invested in 6 projects such as establishment for the National Disaster Management System, operation of Earthquake Research Center, and modernization of meteorological observation.

## Recovery and Rehabilitation

### 1. Community Assistance Programs Activated By a Disaster Declaration

#### 1.1 Public Assistance Grant Program

The objective of the National Emergency Management Agency's (NEMA) Public Assistance (PA) Grant Program is to provide assistance to local governments, and certain types of Private Nonprofit organizations so that communities can quickly

# Disaster Management System

respond to and recover from major disasters or emergencies declared by the President.

## 1.2 Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) provides grants to local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.

## 1.3 Fire Management Assistance Grant Program

Fire Management Assistance is available to local governments, for the mitigation, management, and control of fires on publicly or privately owned forests or grasslands, which threaten such destruction as would constitute a major disaster.

## 1.4 All NEMA Grant and Assistance Program

- Buffer Zone Protection Program (BZPP)
- Emergency Management Performance Grant (EMPG)
- Homeland Security Grant Program (HSGP)
- Intercity Bus Security Grant Program (IBSGP)
- Operation Stonegarden (OPSG)
- Port Security Grant Program (PSGP)
- Regional Catastrophic Preparedness Grant Program (RCPGP)
- Transit Security Grant Program (TSGP)
- Trucking Security Program (TSP)
- UASI Non-Profit Security Grant Program (NSGP)

## 2. Community Recovery

### 2.1 Long-Term community recovery resources

Find the information local governments need to initiate and maintain a planning process that will result in safer communities.

## 2.2 National Agencies Providing Disaster Assistance

Information for agencies providing assists mission assignments including how to seek reimbursement and prepare the Progress Report.

## 2.3 Progress and situations of the Hyogo Framework for Action (HFA)

To promote the HFA in the region the Asian Conference on Disaster Reduction (ACDR) is hosted by the Korean Government with the full support and guide by ADRC from March 15 to 16, 2006.

## Resources

### 1. Environmental and Historic Preservation

The Environmental Planning and Historic Preservation (EHP) program integrates the protection and enhancement of environmental, historic, and cultural resources into NEMA's mission, programs and activities; ensures that NEMA's activities and programs related to disaster response and recovery, hazard mitigation, and emergency preparedness comply with national environmental and historic preservation laws and executive orders; and provides environmental and historic preservation technical assistance to NEMA staff, local partners, and grantees and subgrantees.

### 2. NEMA Acronyms, Abbreviations and Terms (NAAT List)

The NAAT List is a handy reference for the myriad of acronyms and abbreviations used within the national government, emergency management and the first response community.

### 3. Grant Information

Some grants are available only by a presidential

declaration of a major disaster or emergency that designates the grants be made available.

#### 4. Hotel/motel fire-safe list

This page is provided for National Government travelers required to stay in properties listed on the Hotel-Motel National Master List when on official travel. Approved properties may be found by selecting the Search link. Property owners who would like to register their property on the list may do so by selecting the Register link.

#### 5. Information Resource Library

The NEMA Library is a searchable web-based collection of all publicly accessible NEMA information resources, including: CDs, DVDs, VHS tapes, audio tapes, disability resources, posters and display items, brochures, publications, guidance and policy papers, program regulations and guidelines, forms, slide presentations, and some documents. It allows users to better locate, download to your computer to save and print items from the web. Use the links on the left to locate the resources.

#### 6. National Response Plan

Basics for how the national government coordinates with state, local and tribal governments and the private sector during incidents.

#### 7. Other Resources

- Mitigation Best Practice Portfolio
- Mapping Information Platform (MIP)
- Map Service Center
- Emergency Management Institute
- Fire Administration

#### 8. Websites

##### 8.1. National Institute for Disaster Preparedness

Disaster information available from government and non-government organizations, means to securely exchange sensitive information relating to disaster preparedness, response, mitigation and recovery.

##### 8.2. National Emergency Management

Training and education?resources targeted towards emergency management official including National Incident Management System (NIMS) training, Incident Command System (ICS), National Response Plan (NRP), Disaster Basics, Continuity of Operations (COOP), and several other disaster preparedness courses.

##### 8.3. TCDIS.org

Typhoon disaster information available from government and non-government organizations, means to securely exchange sensitive information relating to disaster preparedness, response, mitigation and recovery.

#### Recent Major Disasters

##### 1. Typhoon Rusa (August 30- September 1, 2002)

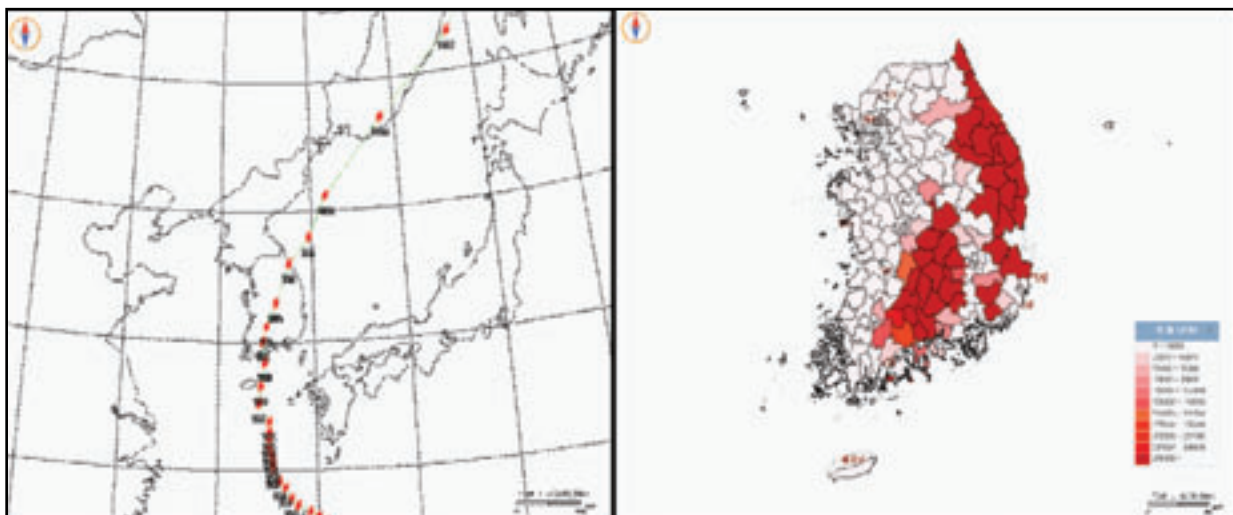
On August 23, 2002, on the sea that is 1,800km far away in the northeast from Guam in Mariana Island in West Pacific, tropical rainstorm was developed, and on August 28 and 30, the central atmospheric pressure became strong enough to be 950hPa and then, changed to typhoon. It passed through the southern sea of Gagosima in Gyusu, Japan, and on the 58km point in the east of Seoguipo, Jeju around 12o'clock on August 31, it changed its direction to north and at 15:30 hours on the same day, it arrived at the southern coast of Goheung Peninsula, Jeollanamdo. And then, it passed through Suncheon in



# Disaster Management System

Jeollanamdo, Namwon and Muju in Jeollabukdo, Youngdong, Boeun and Chungju in Chungcheongbukdo, and Pyeongchang, Inje, Gangneung and Sokcho in Gangwondo (Figure A-24b). Around 15:00 hours on September 1, it became weak to tropical atmospheric pressure at the 130km point in the northeast of Sokcho and then, disappeared. Southern part of the Korea was damaged from typhoon Rusa such as lives damage of 184 people (124 deaths and 60 missing), properties damage shown in Figure A-25a of total \$5,469 million, Suf-

ferers of 27,619 households and 88,626 people. 17,046 buildings and 143,261ha farm land (Figure A-25b) are flooded and major backbone networks like roads (Figure A-25c), railways, electricity, communication, etc. in the nation, and infrastructure for living were collapsed or paralyzed. Figure A-24b shows the damaged farm land from typhoon Rusa.



**(a) Track of Typhoon**  
**Figure A-24. Information of Typhoon Rusa.**



(a) (b) (c)

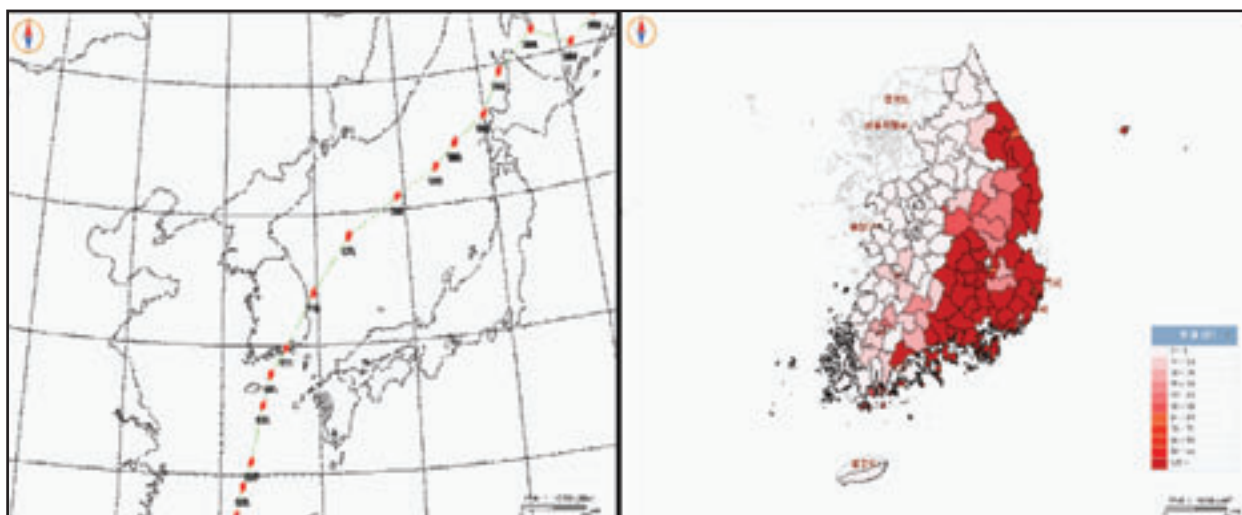
**Figure A-25. Photos of Damage from Rusa (a. Flood damage of Gimhae city, b. Bridge damage at Muju city, c. Janghyun reservoir destroyed)**



## 2. Typhoon Maemi (September 12-13, 2003)

The typhoon Maemi passed through the southern sea of Gagosima in Gyusu, Japan, and on the 58km point in the east of Seoguipo, Jeju on September 12, it changed its direction to north and at 09:30 on the same day, it arrived at the southern coast of Goseung Peninsula, Jeollanamdo with 955 hpa of atmospheric pressure. And then, it passed through Geojae in Jeollanamdo, Milyang in Kyungsangnamdo, and Pohang in Kyungsangbukdo. Around 00:00 on September 13, it move to 130km point in

the northeast of Sokcho and then, disappeared. Damages from typhoon Maemi hit the Southern part and Eastern part of the Korea are damage of lives are 130 people (117 deaths and 13 missing), damage of properties are \$4,781 million, sufferers from flood are 4,089 households and 10,975 people in which 421,015 houses and 37,986ha farm land are flooded, 2,278 roads and bridges, 2,676 points of rivers, and 27,547 points of hydraulic facilities were lost or collapsed.



(a) Track of Typhoon

(b) Distribution of numbers of sufferers

Figure A-26. Information of Typhoon Maemi.





SINGAPORE

## Introduction

Singapore is a small city-state with a land surface area of 707 square kilometers, geographically located outside the 'Pacific Rim of Fire'. While it is spared from natural disasters such as tsunamis, earthquakes, and volcanic eruptions, it is not entirely safe from man-made disasters. The Singapore Civil Defense Force (SCDF), the nation's emergency service provider, has been charged with the task of preventing and mitigating such man-made disasters in a highly urbanized environment with many high-rise buildings and Hazardous Material industries. The global threat of terrorism loomed large in recent years, and this has also added a new dimension to emergency preparedness and response for Singapore.

In Singapore, Ministry of Home Affairs (MHA) is the principal policy-making and directing authority responsible for civil defense, emergency preparedness and disaster management in Singapore. Under its command, the Singapore Civil Defense Force (SCDF) is the national authority that will coordinate, plan, command and control all operations undertaken by the HomeFront agencies to mitigate major disasters.

### 1. Institutional Structure

The Ministry of Home Affairs (MHA) is the principal policy-making government body for safety and security in Singapore. In the event of a national disaster, MHA leads at the strategic level of incident management. At the tactical level, SCDF will coordinate the planning and execution of the multi agency response to mitigate the impact of the disaster.

In Singapore, the lead agency for disaster response is the Singapore Civil Defense Force (SCDF). It has a workforce of about 5,100 staff and operates on a three-tier command structure, consisting of HQ

SCDF commanding four territorial Civil Defense Divisions (CDD). The CDDs command 14 fire stations, which provide the resources for incident management on the ground. Satellite Fire Posts (SFPs) have also been established for fire fighting and emergency response, to bridge any operational gaps, thus enabling faster response to incident sites whenever incidents occur. The SFPs, unlike Fire Stations, were built into existing buildings and infrastructure. The advantage of these SFPs is that they can be relocated quickly and at a low cost when the need arises. To date, the SCDF has established 22 SFPs within the community heartlands and residential districts. In addition, the SCDF also operates two training institutions, namely the Basic Rescue Training Centre (BRTC) and the Civil Defense Academy (CDA). The latter is a purpose-built training academy, equipped with a wide range of training facilities. The CDA is dedicated to equipping not only SCDF officers, but also the international community with the knowledge and skills to protect and save lives and property.

SCDF provides effective 24-hour fire fighting, rescue and emergency ambulance services. Other functions include educating the community as well as mobilising the community to be more involved in safety and security. SCDF also enforces fire safety requirements and oversees the civil defence shelter construction programme and the public warning system.

SCDF operates a 3-tier command structure, with Headquarters (HQ) SCDF at the apex commanding 4 Land Divisions. These Divisions are supported by a network of Fire Stations and Satellite Fire Posts strategically located over the island. Operations are based on a multi-tier response. The Operations Centre at HQ SCDF will despatch the nearest resources to the incident (additional resources from other fire stations may provide reinforcements if needed). Further resource requirements can be met by the Special Rescue Battalion (SRB), the recall of off-duty fire fighters as well as Reservist units,

known as Operationally Ready National Service (ORNS) units.

SCDF has played a pivotal role in providing emergency rescue services over the years. SCDF has also leveraged on technology to be more effective in the conduct of operations and incident management. In addition, the community has also been roped in at various levels to assist in Civil Defence preparedness measures, thus ensuring the population as a whole is better prepared for any emergencies. At the same time, Singapore is ever ready to lend assistance to regional and international partners. SCDF will continue on the path to further enhance its capability to keep in pace with the dynamic and changing environment.

## 2. Procedures and Mechanisms

SCDF has developed the Operations Civil Emergency (Ops CE) Plan, a national response plan for civil emergencies which outlines the work of SCDF and all the Related Agencies (RAs) in the management of a major disaster. Under this plan, SCDF is overall-in-charge of the multi-agency response. SCDF will direct and co-ordinate the agencies' responses through the Joint Planning Staff (JPS) who provide specialist advice to manage the incident. As highlighted earlier, ORNS units may also be mobilised and deployed should the additional manpower be required.

This national plan is exercised regularly on an annual basis to ensure all agencies are familiar with their roles and functions and develop their response capabilities for incident management. Through such exercises as well as recent major incidents, the Ops CE plan gets refined.

## 3. International Engagements

SCDF does not confine itself to the local communi-

ty, but has also strengthened international ties in disaster management such as being a member of the International Search and Rescue Advisory Group (INSARAG), United Nations Disaster Assessment and Coordination (UNDAC), Asia-Pacific Humanitarian Partnership (APHP), Asian Disaster Reduction Centre (ADRC), Asian Network of Major Cities 21 (ANMC21) and ASEAN Committee on Disaster Management (ACDM).

Singapore has been assisting the regional and international agencies in their efforts in capacity building by offering international courses conducted at the Civil Defence Academy (CDA). The courses offered include, the International Urban Search and Rescue Course, International Fire Fighting Course, International HazMat Course, International Disaster Management Course and International Fire Investigation Course. Besides, overseas participants have also attended the SCDF Basic Officers Course, and the Emergency Response Specialists Course, together with our local trainees. Since its establishment in 1999, CDA has trained more than 1420 participants from 80 countries.

On 24 October 2007, SCDF hosted the regional level exercise called The ASEAN Regional Disaster Emergency Response Simulation Exercise 2007, code-named (ARDEX-07). The exercise focused on a disaster relief operation that was jointly performed by Singapore as a host country, participating ASEAN member countries, as well as invited teams from the United Nations and International Organisations. This multi-agency exercise had effectively validated the ASEAN Standard Standby Arrangement for Emergency Response and Disaster Relief SOP (SASOP).

Singapore has an Overseas Rescue Contingent (Operations Lionheart Contingent) on standby, ready at 2 hours notice to render assistance to other countries. To date, the Contingent had been deployed to 9 disaster-stricken areas around the region, such as Baguio City in Philippines (1990),

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Banda Aceh/Indonesia and Khao Lak/Thailand (2004) for Asian-Tsunami disaster, the Nias island in Indonesia (2005), and to Yogyakarta, Central Java where a devastating earthquake struck.

As part of SCDF's effort for Global Humanitarian Outreach, SCDF has successfully obtained the International Search and Rescue Advisory Group (INSARAG) External Classification of its Lionheart Contingent as a Heavy Urban Search and Rescue (USAR) Team. The classification as a Heavy USAR Team provides the Force with an international standard of recognition for its USAR competency to render assistance to countries in need. SCDF is the 1st USAR team to achieve this classification in the Asia-Pacific.

SCDF has 6 UNDAC-Trained officers on 24/7 standby for deployment under UN OCHA to disaster-hit countries for disaster assessment and coordination. SCDF UNDAC teams were deployed during Indian Ocean Tsunami in December 2004, Nias Earthquake (Indonesia) in March 2005, Pakistan Earthquake in October 2005, Philippines Landslide in February 2006, and Central Java Earthquake (Indonesia) in May 2006. More recently, in May/June 2008, SCDF deployed its UNDAC team in response to the Cyclone Nargis disaster in Myanmar.

SCDF is one of the founding members of the APHP that comes under the purview of UN OCHA to support to the UNDAC teams operations with specified communication equipment and establishing of On Site Operation Coordination Centre (OSOCC). SCDF is also the first country to operationalise the APHP. SCDF's APHP teams were deployed during the Central Java Earthquake and had also participated in various regional and international disaster exercises in support of UN OCHA. Currently SCDF has 5 APHP members on 24/7 standby.

## Prevention and Preparedness

The Emergency Preparedness and Disaster Management activities undertaken by Singapore are based on three main principles namely Prevention, Readiness and Awareness.

### 1. Prevention

The tragic consequences resulting from major incidents are minimised through prevention, via a set of comprehensive government regulations on fire and building safety, as well as security measures to limit terrorist threats. The amended Fire Safety (Petroleum and Flammable Materials) Regulations 2005, for example, extends regulatory control on flammable materials to further safeguard public safety and security. The regular fire safety enforcement inspections by the SCDF, for instance, are conducted to ensure operational effectiveness of safety systems and prevent human negligence; while the HazMat Transport Vehicle Tracking System (HTVTS), a round-the-clock GPS based remote tracking system of HazMat vehicles within Singapore, serves to deter such vehicles from being used as weapons of mass destruction by potential perpetrators. Today, all HazMat transport vehicles, including foreign registered ones entering Singapore are tracked real-time. On 1st April 2007, SCDF implemented the next phase on HazMat security that involved the installation of an immobilizer device in all HazMat transporting vehicles. This gives us the ability to stop any HazMat transport vehicles instantaneously once a security breach is detected. The HTVTS will also be extended to track the transportation of other class hazardous goods to bring about a more holistic approach toward enhancing the safety and security aspects of hazmat transportation on Singapore's roads.

Besides enhancing vigilance and safety in the transport of hazardous materials through HTVTS, the amended Fire Safety (Petroleum and Flammable Materials) Regulations 2005 also includes the



requirement of having a competent in-house Company Emergency Response Team (CERT) for companies storing more than 5,000 litres or 5,000 kg of petroleum or flammable materials (FM). Since April 2008, periodic assessments of the CERTs are conducted by SCDF to ensure their competency in mitigating the hazards of storing bulk flammable materials which include fire and Hazmat spillages, before such incidents turn into major disasters. Numerous Dialogue sessions were conducted to brief the industries and gather feedback for incorporation into the guidelines. A series of seminars and workshops were also conducted to educate the industries on the CERT requirements. This is to assist the companies in setting up their CERT and familiarise themselves with the requirements in preparation for the audits. The audit verification checklist will also be continually reviewed to ensure that it is kept relevant.

Currently, quantitative risk analysis (QRA) is a tool used by agencies for land-use planning. However, QRA traditionally only focuses on safety aspects and does not consider the effects on society which take into account population density and the aggregation of risks in a cluster of industries. While a QRA satisfactorily provides the worst-credible scenario based on safety issues, it fails to address the element of security and vulnerability. It focuses on “what can go wrong”, rather than consider “how can someone make something go wrong”, with the latter addressing the worst plausible scenario. To address the latter, SCDF will be developing a more comprehensive risk assessment approach that takes into account security, vulnerability and economic factors, besides safety, by working with all other relevant government agencies to review the risk assessment approach and its risk tolerance criteria.

## 2. Preparedness

The second principle, readiness, is contingent upon preparation and the beefing up of response capabilities, tapping not only on expert knowledge and

know-how of individuals, but leveraging on high technologies and innovation as well. To enable an effective response to new threats, greater focus has been placed on incident management. A seamless sharing of information across key incident management systems such as CUBICON is being pursued. For the coming year, SCDF will work with related agencies and vendors to develop a new generation of incident management system, CUBICON II. In addition, Singapore will be developing an Operations Terrain Mapping (OTM) system that will provide easy retrieval of operational data by various government agencies for contingency planning purposes. Recognising that resource management is vital to the successful mitigation of an incident, a one-stop centre collating resources availability across the Homefront has been developed. Named PRISMS, this system serves all Homefront Agencies and provides them with an overview of all available resources for incident management as well as the means to monitor their activation and deployment.

Unconventional threats can result in mass destruction of lives and properties or be aimed at an important public figure or icon to cause alarm and panic in public. Some instances of these threats include ‘dirty bomb’ incident, release of chemical warfare agents in crowded public areas and ‘white powder’ incident. To address such instances, the HazMat Control Vehicle of SCDF is equipped with advanced instruments to perform wide-area radiological survey, radioactive particulate collection and sampling. All SCDF frontliners are equipped with capabilities to detect and identify radiological materials, the Special Rescue Battalion (SRB) has also been equipped to conduct mass screening of radiologically contaminated persons and are able to decontaminate casualties who have been affected. HazMat Specialist are also equipped and trained to mitigate and contain radiological sources so as to minimise danger to the public from excessive exposure.

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To improve capabilities in incendiary fire investigation, SCDF has operationalised the concept of arson investigation using trained dogs that are trained in-house. The benefits of this concept includes an improved accelerant sampling hit rate, enhanced accuracy in determining the possible point(s) of fire origin, and also long term evidence analysis cost and investigation man-hour savings.

Contingency planning and regular exercises, involving various public agencies, industries and the community in different emergency scenarios, including unconventional threats, further enhance the nation's readiness to handle crisis. Departments in the Ministry of Home Affairs conduct regular joint community exercises annually to familiarise the public on how to mobilise their resources and deal with large scale emergencies within their neighbourhood.

### 3. Exercise Northstar

Exercise Northstar V was conducted on 8 Jan 2006. Led by SCDF, this exercise was modeled after the 7 July London bombings, and a total of about 2000 participants from 22 agencies worked together in a multi-agency response. Some 3,400 real commuters together with volunteers took part in the event, making it the largest Civil Emergency exercise ever held in Singapore. This Exercise was extremely crucial in enhancing disaster management and emergency response capabilities in Singapore. Exercise Northstar V called for a joint multi-agency response. It served to test almost every agency's contingency plans in a multiple incidents scenario-based Exercise.

In addition, the exercise saw large-scale involvement of members of the public. Unsuspecting commuters were evacuated out of the affected trains when the "bombs" were detonated. It highlighted the ever-increasing role of the average citizen in preparing for the threat of terrorism and their sub-

sequent response to any possible terror attacks that may occur within the heartland. Such heightened awareness and resilience will go a long way in our fight against terror.

Moving forward, a large-scale maritime emergency scenario set the backdrop for Exercise Northstar VI that was conducted on 23 May 08 to validate the Passenger Vessel Mishap Contingency Plan (PVMCP). This exercise saw the evacuation of 850 passengers from the burning cruise ship: ferries, salvage barges and a Chinook helicopter were mobilized to evacuate the passengers. In total, 1606 participants from 12 ministries and related agencies were involved and the exercise clearly brought out the reality and challenges in mounting a large scale maritime evacuation requiring a concerted response from various agencies.

### 4. Early Warning

Apart from enhancing the readiness of the first responders, a Public Warning System (PWS), consisting of a network of sirens, was commissioned in 1992 to provide early warning to the general population of any imminent threats that could endanger lives and property. The outdoor sirens are strategically located throughout Singapore to provide a comprehensive island-wide acoustical coverage. In the event of an impending attack by a hostile element or the occurrence of a man-made or natural disaster, the PWS will be sounded to alert the public to seek refuge at communal or household shelters. In conjunction with the activation of the PWS, the commercial radio and television stations will also broadcast any advisory messages from SCDF. As at Jun 2008, the PWS coverage of the island is 98%.

Conscious efforts were also undertaken to acquaint and educate the public with the various types of warning signals and corresponding actions to be taken. Besides the monthly soundings, the sirens

were also activated to commemorate special events such as Total Defence Day and Civil Defence Day. The monthly activations concurrently serve as a mean to test and ensure the operational readiness of the PWS.

## 5. Public Education

Singapore's civil defence foundation is laid not only by having a well-trained and prepared team of emergency responders and crisis managers, but also having a well-trained and prepared community to handle emergencies. Hence, the Ministry of Home Affairs constantly engages the people through a series of public education programmes to enhance public awareness in emergency preparedness. The Ministry of Home Affairs has established the Community Safety and Security Programme (CSSP), a framework that encourages the community to look after its own safety and security through self-help and mutual support. It also serves to foster community cohesion and harmony among local grassroots leaders, residents, students and workers. The Civil Defence Executive Committees or CDECs who are strategic partners of the SCDF also help to promote CD messages at the community level. There are 84 such committees, one at each constituency. Since the 911 incident, the CDECs have taken on an enhanced role in preparing the residents for emergencies. When organizing Community Safety and Security Programmes (CSSPs), the CDECs would incorporate new learning elements like dealing with suspicious-looking objects/persons and knowing how to conduct In-Place Protection Procedures (IPP) during a chemical attack incident. This is part of the concerted effort to heighten community vigilance and emergency readiness.

Since 2003, a total of 354,485 participants had attended the various modules of the Community Emergency Preparedness Programme (CEPP) which is offered free of charge daily at Civil Defence

establishments. The modular-based programme provides both theory and practical training and comprises 5 modules which cover First Aid, Cardio-Pulmonary Resuscitation (CPR), Fire Safety and Casualty Evacuation, Emergency Preparedness for War and Emergency Preparedness for Unconventional Threats. The programme is conducted daily at the 4 CD Division HQs on weekday evenings from 7.00 pm to 9.30 pm and on weekends (Saturday from 2.00 pm to 7.30 pm, Sunday from 9.00 am to 6.00 pm). A one-day training programme is also available. The modular training package offers the residents the flexibility to choose to attend any of the 5 modules or to attend all at their own pace at no charge. In view of its popularity, the SCDF has widened the programme's outreach by offering the programme to various groups in the community, e.g. religious groups, security guards and foreign workers.

To further equip emergency preparedness knowledge and skills among the population, the 6th edition of the Civil Defence Emergency Handbook will be made available to members of the public in September 2008. The handbook is a comprehensive guide on emergency procedures in handling conventional and unconventional threats. The new / revised contents include AED (Automated External Defibrillator), post blast procedures, landslides, updated CPR procedures and updated tremor procedures.

As part of the innovative efforts to reach out and educate the public, a technology-based initiative known as "My Ready Mobile" was launched on 3 April 2007 to provide users with easy access to emergency preparedness skills on the go. Through a dedicated section in the SCDF website and SCDF mobile wap site, members of public are able to download bite-sized public education animation clips or text midlets into their mobile phones. This provides users with easy access to the information for learning on the go. 15 Ready Mobile animation clips and text midlets as well as a web mobile infra-

## Disaster Management System

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structure to support the downloading of clips and midlets were produced. As at 30 June 2008, a total of 9,386 animation clips and 1,469 text advisories were accessed since the programme was introduced on 3 April 2007, with “Tremors”, “Power Outage”, “Exposure to Biological Agent”, “Exposure to Chemical Agent” and “Evacuation Procedures” being the top five popular downloads.

As a continuation to the Ready Mobile project to sensitize the general public in utilising their mobile phones as a tool to refer to for emergency preparedness information, SCDF propagated the I.C.E programme-short for “In Case of Emergency”. Mobile phone users were urged to put the acronym “ICE” before the names of the people they want to designate as next-of-kin in their address book. This would enable emergency service providers such as paramedics or fire fighters to quickly identify and contact the victim’s next-of-kin in the event of a disaster. The I.C.E programme was promoted alongside the Ready Mobile during EP Days to create awareness on its usefulness and educate residents on how they can key in ICE numbers in their mobile phone.

As a means of enabling individuals to measure their level of emergency readiness, SCDF designed an on-line readiness assessment tool known as the “Individual Readiness Assessment” or IREA which allows an automatic tabulation of the individuals’ readiness status and advises them on the steps to be taken to improve on their readiness based on their current performance. With this interactive tool, members of public can gauge their level of readiness in the area of emergency preparedness. The programme, which is available on the SCDF internet website, will broadly assess members of public in the three areas of Awareness, Preparedness and Confidence through 2 sections of questionnaires and 5 interactive simulation games. Through the self-assessment input from the individual, the programme enables the tabulation of scores and generation of analysis reports, indicat-

ing the readiness level as well as the avenues for improvement. As at 30 June 2008, the participation rate has reached 17,302 since the programme was launch on 1 September 2007.

The SCDF believes in preparing the community adequately in emergency preparedness skills and knowledge to deal with crises and emergencies. As yet another initiative, we have produced this special edition Ready Book intended for use as a reference compendium for emergency preparedness practitioners of various target groups, in the public, commercial and industrial premises, media industry, schools, grassroots and religious institutions. This Ready Book aims to guide and facilitate emergency preparedness practitioners in contingency planning. This guidebook provides its recipients with informative material to prepare the organizations for any crises or emergencies. Its content includes general public advisories and key emergency information, with some sections customized to suit specific needs of the different target groups.

The SCDF works closely with the Ministry of Education (MOE) to incorporate emergency preparedness as a subject within the Civics and Moral Education syllabus for students in the primary and secondary levels which comprises progressive workbooks on safety and security. As part of Emergency Preparedness (EP), SCDF introduces short EP modules on essential skills and knowledge in surviving emergencies for schools to conduct during assembly periods. A Workbook, Training Kit and Teacher’s Handbook for pre-schoolers were produced to educate pre-schoolers on Civil Defence. SCDF also incorporated the new element of terrorism and chemical/ biological agent (CA/BA) threats into its existing schools’ programme such as the Schools Assembly Talk, Uniformed Group Training, Emergency Exercises and the Learning Journey Programme, which incorporates school students’ visits to Fire Stations. SCDF is also gaining a tangible foothold in schools with the establishment of the National Civil Defence Cadet Corps (NCDCC) for

secondary students. In 2005, the first batch of 12 schools was roped in as the pioneer secondary schools to launch the NCDCC. Today, there are a total of 33 secondary schools offering NCDCC as one of the co-curricular activities for secondary school students.

Besides equipping the population with Emergency preparedness knowledge and skills, SCDF also conducts regular community exercises within the residential heartlands. These exercises which are based on disaster and terrorism incidents serve to practice the residents and familiarise them with the procedures and actions that they need to undertake individually or collectively to ensure their survival should an incident occur. In-place Protection, First Aid, CPR and Firefighting Validation Booths are set up to test the residents' skills in emergency preparedness.

## Recent Major Disasters

SCDF has been challenged and tested by several major incidents in the past. Examples of these incidents are elaborated below.

### 1. Nicoll Highway Cave-in

On 20 Apr 2004 at 1535 hrs, part of Nicoll Highway, a major local road, collapsed, rendering it unusable. Steel structures supporting the tunnelling of a subway line beneath the highway had given way, resulting in a massive cave-in at the construction site which also affected the road above it. The 5-day long rescue operations was made even more difficult by 2 heavy downpours that resulted in danger-

ous soil conditions which threatened the stability of neighbouring buildings and the safety of the rescuers. A total of 3 workers were injured and 4 were killed.

The rescue operation saw the close cooperation and coordination amongst various government agencies as well as from the construction company handling the project. Operation Civil Emergency (Ops CE), a national response plan for local major disasters, was implemented and many aspects of the inter-agency response were tested.

### 2. Pulau Merlimau Fire

On 25 Oct 1988, a fire occurred at one of the chemical storage tanks at the Singapore Refining Company (SRC) on Pulau Merlimau, an off-shore island. The fire built up rapidly and spread to the two other nearby tanks. Fortunately, there were no casualties. The fire-fighting operation lasted 5 days and many parts of Singapore were showered by soot from the fire. The fire highlighted the need to handle large tank fires swiftly, considering the large number of such tanks located in the south-western parts of the island.

### 3. Hotel New World Collapse

The Hotel New World disaster occurred on 15 Mar 1986 at 1125 hrs. The six-storey building with 1 basement car park collapsed suddenly due to structural faults. Rescue operations lasted 7 days. Out of the 50 people trapped in the rubble, 33 perished while 17 were successfully rescued.







THAILAND

### Introduction

The Kingdom of Thailand shown in Figure A-27 is located in the Southeast Asia. Her boundary is bordered to the north by Laos and Burma, to the east by Laos and Cambodia, to the south by the Gulf of Thailand and Malaysia, and to the west by the Andaman Sea and Burma. By the maritime boundary, the country is bordered to the southeast by Vietnam in the Gulf of Thailand, to the southwest by Indonesia and India in the Andaman Sea.



**Figure A-27. Kingdom of Thailand**

In the geographic background, Thailand is divided into 4 regions; the North is mountainous area which is prone to flash flood, landslide/ mudslide and earthquake. The Northeast is arid area and always faces on severe drought and flood. The Central region is the Basin of Chao Praya River and

become flood during the rainy season. The South is hilly to mountainous with several offshore islands and encounters flood, tropical storm, landslide and forest fires. Thailand is considered to be the world's 50th largest country in terms of total area, with a surface area of approximately 513,119 sq. km, and the world's 20th largest country in terms of population with approximately 63 million people on December 2005.

Thailand divided administratively into 76 provinces 926 districts 7,409 sub-districts and 74,427 villages. Bangkok is a special administrative area and the capital city.

There are three seasons in Thailand: the cool season (November to February), the hot season (March to May), and the rainy season (June to October). The climate is warm and tropical and affected by an annual monsoon, with a rainy season from June to October and a dry season the rest of the year. Temperatures average 75 to 92 degrees Fahrenheit, with the highest temperatures from March to May and the lowest in December and January. Tropical, rainy, warm, cloudy southwest monsoon from mid-May to September. Dry, cool northeast monsoon from November to mid-March, southern isthmus always hot and humid.

### Current disaster information

The core disaster in this country is flood, drought and storm but not too severe when compare with other countries. The recent major flood events are as follows:

In 2000, inundated in Hard Yai District, Songkla Province resulted in large number of fatalities, loss properties and economy.

The year after in 2001, flood and landslide occurred in Phrae province and Petchaboon province. In Phrae province, there is heavy rainfall in Wang Chin district

and nearby districts, which was influenced by a depression. This resulted in flood and landslide and damage to 6 sub-districts. There were totally 1,651 affected households, 38 deaths, 3 missing people, 58 injured people and 137.17 million baht damage estimate. In case of Petchaboon province, the cause of flood and landslide at Nam Ko and Nam Chun sub-districts, in Lom Sak district, Petchaboon Province was influenced by tropical cyclone "Usangi". The event caused severe damages, 135 deaths and 4 missing people and it resulted in damage to 600 households, agricultural and livestock area, irrigation structures and people's weir.

However, on 26 December 2004, Tsunami disaster,

it is the first time that Thailand encountered the most catastrophic incident in the history. This situation killed more than 230,000 people in the Indian Ocean countries and later, the global organizations concerned efforts encourage the measures/ strategy on disaster reduction.

During May 21 - 23, 2006, the heavy rain in Uthairit province caused flood in the province and expanded to nearby provinces: Sukothai, Prachin and Nan province. It resulted in the severe damage, 88 deaths, 28 missing people 352,016 affected people and 704 households, including infrastructure, agriculture and livestock areas.

**Table A-10. Statistical Data of Disasters and Damages in Thailand**

Year	Dis...subset	Frequency	Affected People	Fatalities	Injuries	Damages(US) 1US=34.5Baht
2002	Flood	5	5,127,652	216	0	387,980,190
	Drought	-	12,841,110	-	-	14,747,303
	Strom	594	70,156	18	11	6,183,707
2003	Flood	17	1,882,017	44	10	59,427,891
	Drought	-	5,939,282	-	-	5,053,026
	Strom	3,213	454,318	74	434	13,258,834
2004	Flood	12	2,324,441	28	3	24,656,800
	Tsunami	1	58,550	5,396	8,457	371,568,184
	Drought	-	8,388,728	-	-	5,526,634
	Strom	3,834	181,512	73	63	11,548,315
2005	Flood	12	2,874,673	75	0	173,399,515
	Drought	1,847	11,147,627	-	-	219,300,322
	Strom	1,313	61,429	13	-	4,315,123
2006	Flood	6	6,050,674	446	1,462	279,055,612
	Drought	-	11,862,358	-	-	14,355,818
	Strom	1,883	142,849	29	39	2,673,742
2007	Flood	13	2,326,179	36	17	48,923,652
	Drought	-	16,754,980	-	-	5,747,963
	Strom	2,233	245,619	10	71	6,798,468

Source: Department of Disaster Prevention and Mitigation ([www.disaster.go.th](http://www.disaster.go.th))

## Disaster Management System

The policy mechanisms of the disaster management under the Disaster Prevention and Mitigation Act 2007 are Disaster Prevention and Mitigation Committee, National Disaster Prevention and Mitigation Plan, as well as the operation mechanism, Department of Disaster Prevention and Mitigation, Bangkok Metropolitan Administration (BMA), provinces and relevant agencies have their functions to prevent and mitigate the disaster occurrences.



**Figure A-28. Disaster Prevention and Mitigation Committee Chart**

### 1. Disaster Prevention and Mitigation Committee

The Disaster Prevention and Mitigation Act 2007 is the main law to manage disasters in Thailand. According to the Act, the disaster means both natural disaster and manmade disaster including air threat and sabotage. National Disaster Prevention and Mitigation Committee (NDPMC) is the main policy making body. The committee comprises Prime Minister or designated Deputy Prime Minis-

ter as chairperson, Ministry of Interior as first vice chairperson, Permanent Secretary to Ministry of Interior as second vice chairperson and the membership from the national government concerned. Director - General of Department of Disaster Prevention and Mitigation is designed as member and secretariat of the committee.

### 2. Function of NDPMC

To determine the policy for formulating the national disaster prevention and mitigation plan and consider the national draft plan before submitting it to the cabinet is a key function of NDPMC. Moreover, NDPMC has a duty to issue the regulations on the payment of remuneration, compensation and other expenditures relevant to disaster prevention and mitigation activities under the regulation of Ministry of Finance.

### 3. Structure of Disaster Management

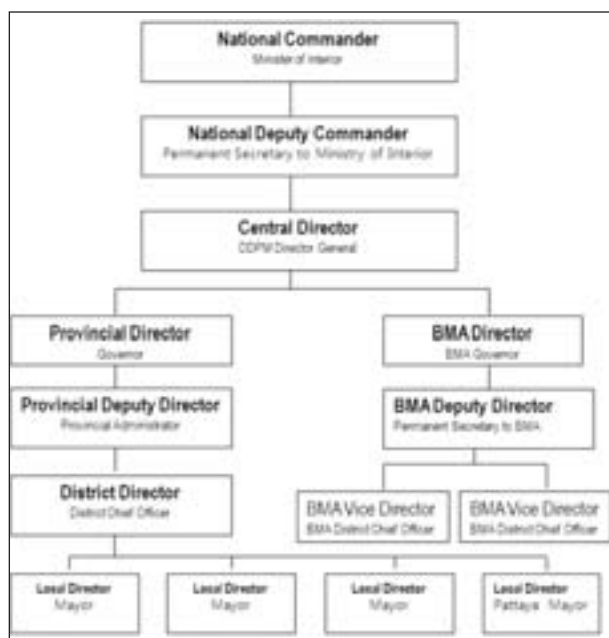
According to the law, Thailand disaster management in the normal situation, Minister of Interior as National Commander has authority to control and manage disaster incident throughout the country. DDPM Director General as Central Director will control and supervise the operation of the Provincial Director or other directors in local administrations and civil defence volunteer all over the country.

In the provincial level, the Governor as the Provincial Director will be responsible for operating disaster prevention and mitigation of the province. As well as the district, the District Chief Officer as the District Director will carry out the disaster prevention and mitigation in the district. In case of the catastrophic event, Prime Minister or designated Deputy Prime Minister will be in charge of Chief of Commander empower to command and deploy all of resources for disaster prevention and mitigation.

This chart below will show the structure of disaster management system that integrates all agencies concerned government organizations, volunteers, NGOs and foundations including International/ regional organizations to prevent and mitigate disaster occurrences.



**Figure A-29. Thailand Disaster Management System Chart**

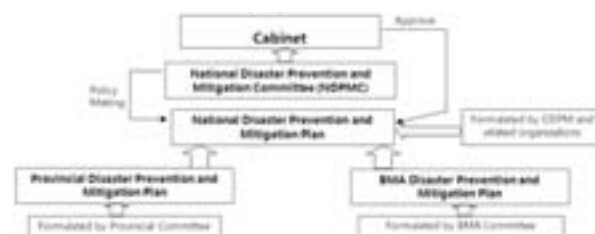


**Figure A-30. Line of Commander during the disaster occurrence**

## 4. The Disaster Prevention and Mitigation Plan

Due to the Disaster Prevention and Mitigation Act 2007, Department of Disaster Prevention and Mitigation takes responsibility to formulate the National Disaster Prevention and Mitigation Plan for propose to NDPMC and submit to the cabinet for approval. This plan serves as the master plan for all agencies concerned and provides guidelines for the formulation of operation plan of the agencies related to disaster management. At present, DDPM proposed to appoint a committee to review the current national plan 2005. In the provincial level, the provincial governor and BMA governor will appoint a committee to formulate the Provincial / BMA Disaster Prevention and Mitigation Plan. This plan will be their operation plan.

Since 2005, Thailand by DDPM formulated the Specific Disaster Master Plan to be guideline of disaster prevention and mitigation in each type of disaster : Master Plan for Flood, Windstorm and Mudslide Hazards Prevention, Mitigation and Recovery Services in Emergency Period ( 5- Year Master Plan), Master Plan for Tsunami Evacuation Drill and etc. In addition, Thailand conducts the exercise regularly at least two times per year in every provinces and districts to ensure all agencies are familiar with their roles and functions parallel with developing the emergency response teams capabilities. In the regional level, Thailand has sent her response team to participate in ASEAN Regional Disaster Emergency Simulation Exercise which has code name "ARDEX" every year; particularly in this year (2008) ARDEX 08 is hosted by Thailand.



**Figure A-31. Flow chart of the National Disaster Prevention and Mitigation Plan Formulation**



### 5. Department of Disaster Prevention and Mitigation

After the Bureaucratic Reform in October 2002, the government established the Department of Disaster Prevention and Mitigation (DDPM), Ministry of Interior to carry out the task and responsibility of the disaster prevention and mitigation. DDPM's organization is comprised of the divisions in the Headquarter and 12 DDPM Regional Center. Under the current Disaster Prevention and Mitigation Act 2007, DDPM has been designed as the national disaster organization to implement efficiently the disaster management of the country and set up 75 Disaster Prevention and Mitigation Provincial Offices cover the whole country to be its administrative mechanisms in provincial level. Furthermore, DDPM had extended the number of Disaster Prevention and Mitigation Regional Centers from 12 to 18 centers to increase the capacity of disaster prevention and mitigation.

DDPM's mission is to draft a master plan, set up measures, promote, support and implement disaster prevention and mitigation through establishment of safety policy, prevention and warning system, rehabilitation of disaster devastated areas and the follow up and evaluation. All activities have been designed and implemented to secure the safety of life and property of the people.

Duty and Responsibility of DDPM are (i) formulating policy, guideline and set up criteria for disaster management. Study, analyze, research and develop disaster prevention, warning systems and disaster mitigation; (ii) developing information technology system for disaster prevention, warning and mitigation; (iii) mobilizing people's participation in establishing disaster prevention and mitigation; (vi) creating people's awareness and preparedness in disaster prevention and mitigation; (v) arranging the training and exercise in disaster prevention and

mitigation, rehabilitation devastated area and in assisting the victims as stated by law; (vi) Promoting, supporting and carrying out disaster prevention and mitigation activities, provide assistance to the victims and rehabilitate devastated areas; (vii) directing and coordinating the operation of assisting the victim and rehabilitate devastated; (viii) coordinating the assistance with the organizations both internal and international in disaster prevention relief mitigation and rehabilitation.

### Capacity Building to Strengthen Disaster Management System

In 2004, Thailand by DDPM set up Disaster Prevention and Mitigation Academy (DPMA) to be the principal academy in the field of disaster prevention and mitigation for equipping the personnel in charge of disaster management with technical know-how and practical skills which will be beneficial to national disaster management.. DPMA will develop the standard curricula, handbooks and learning materials and conduct training course for the staffs in government organizations, local government, community, civil defence volunteer and other agencies concerned. The main curricula of DPMA are; Fire Fighting, Building Collapse, Hazmats Emergency Management, Civil Defence and Disaster Management. Furthermore, DPMA has extended its technical services network by setting up 6 more campuses in upcountry following as: (i) Prachinburi Campus for the main fire fighting and search and rescue training center; (ii) Songkhla Campus to organize in cases of landslide and flood, tropical storm and sea rescue; (iii) Chiand Mai Campus to specialize in cases of earthquake, flood, tropical storm and mudslide; (vi) Khon Khaen Campus for the flood and drought management; (vii) Phuket Campus for the earthquake and tsunami; and (viii) Phitsanulok Campus for the flood management.



## The Project on Disaster Prevention and Mitigation

### 1. Community Base Disaster Risk Reduction (CBDRM)

Thailand has realized that it is essential to improve public safety for every sector of the people, particularly those who are in the risk areas. "Community Based Disaster Risk Management (CBDRM)" approach is to reduce vulnerabilities and to strengthen people capacity to cope with the disaster risk. Therefore, CBDRM has been applied to generate the awareness and to implant the culture of safety for the people in disaster prone areas.

Thailand by DDPM has cooperated with the local agencies such as Thai Red Cross, Local Authority Department and International Agencies; Asian Disaster Preparedness Centre (ADPC), GTZ, Asian Disaster Reduction Center (ADRC), Japanese International Cooperation Agencies (JICA) to generate the awareness of the general public CBDRM approach. It has attracted the intervention of the people in every community to participate in holistic disaster management. Since 2003-2008, DDPM has continuously launched CBDRM training, at present, more than 30,000 people in 3,354 villages 75 provinces which are the risk communities have been trained on CBDRM by DDPM.

### 2. Mr. Warning Project

Thailand is the flood prone areas. Therefore, DDPM initiated the Flashflood and Mudslide Warning Program to enhance capacity of the local in risk assessment and early warning. Under this program, DDPM has collaborated with Department of Provincial Administration, Department of Local Administration, The Meteorological Department, National Park Wildlife and Plant Conservation Department, and National Disaster Warning Centre to design "Mr. Disaster Warning" training course. This course aims at creating disaster warning net-

work particularly in flashflood and mudslide prone village. "Mr. Disaster Warning" is the village volunteer who has been selected and trained to function as a vigilant, a forewarner and a coordinator. Nowadays, the 7,817 people in the flood prone areas to be trained in this programme.

### 3. One Tambon One Search and Rescue Team (OTOS)

Thailand has recognized the immediate need to establish a range of search and rescue capacities at national, provincial and particularly in local levels. In 2004, Thailand by DDPM has launched the "One Tambon (sub-district) One Search and Rescue Team (OTOS) Programme" which will result in the establishment, training and long-term maintenance of specially trained search and rescue team in every tambon community. DDPM, has incorporated various government agencies and NGO such as Department of Local Administration, Health Insurance Office, Office of Health Promotion and Support Fund, and Thai Red Cross, to achieve the OTOS objectives which the OTOS objectives are (i) to ensure the safety of life, and the rapid and efficient search and rescue operation; (ii) to establish efficient search and rescue team at every provinces, district and tambon in the country; (iii) to enhance capacity and efficient search and rescue team through technical training and drilling; and (iv) to provide first aid treatment and rapid transfer to the appropriate medical establishment. OTOS program has been expected to complete in 2008. Upon the completion, there will be a SAR team (10 members) based in each tambon (7,255 tambons) throughout the country.

### 4. Strategic Action Plan (SNAP) for Disaster Risk Reduction

According to Hyogo Framework, Thailand by DDPM, has cooperated with United Nations International strategy for Disaster Reduction (UNISDR) and Asian Disaster Preparedness Centre (ADPC) to formulate Strategic Action Plan (SNAP)

## Disaster Management System

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for Disaster Risk Reduction for Thailand DDPM set up a working group which is composed of the representatives of the government agencies concerned, private sector and experts to draft SNAP. The draft plan is on process to submit to Cabinet for approval.

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USA

## Introduction

The United States-affiliated Islands in the western North Pacific consist of the US Territory of Guam, the Commonwealth of the Northern Marianas Islands, the Republic of Palau, the Federated States of Micronesia and the Republic of the Marshall Islands (Figure A1-32).



**Figure A-32. Map of Micronesia**

These islands have historically received Disaster Management training and support from the National Weather Service through the Weather Forecast Office (WFO) Guam and from the Federal Emergency Management Agency (FEMA). Occasionally, the islands also receive training from the South Pacific Geosciences Commission (SOPAC). They have also historically received Disaster Recovery

and Mitigation assistance from the FEMA, pending a Disaster Declaration by the US President in response to a request for assistance.

By late 2008, disaster assistance for the Republic of Palau, the Republic of Marshall Islands and the Federated States of Micronesia will be provided by the US Agency for International Development (USAID) Office of Foreign Disaster Assistance (OFDA). USAID is an independent federal government agency that receives overall foreign policy guidance from the Secretary of State and extends assistance to countries recovering from disaster, trying to escape poverty, and engaging in democratic reforms.

## 1. Disaster Management Agencies

The US-affiliated Islands of the western North Pacific have historically received Disaster Management training and support from the National Weather Service through WFO Guam and from the Federal Emergency Management Agency (FEMA) listed in Table A1-11. Occasionally, the islands also receive training from the South Pacific Geosciences Commission (SOPAC).

**Table A-11. Disaster Management Agencies**

Jurisdiction	Agency	Head of Agency	Environmental & Warning Support
Guam	Homeland Security/ Office of Civil Defense (HS/OCD)	Administrator (Under Homeland Security Advisor)	WFO Guam
CNMI (Saipan, Tinian, Rota, Northern Islands)	Emergency Management Office (EMO)	Director (Under Governor)	WFO Guam
Republic of Palau (ROP)	National Emergency Management Office (NEMO)	Director (Under Vice President)	WFO Guam through WSO Koror

Jurisdiction	Agency	Head of Agency	Environmental & Warning Support
Republic of the Marshall Islands (RMI)	National Disaster Management Office (NDMO)	Director (Under Chief Secretary)	WFO Guam through WSO Majuro
Federated States of Micronesia (FSM)	National Disaster Office (NDO) (Policy, Mitigation, Recovery)	Special Assistant (Under Vice President)	WSO Pohnpei with Assistance from WFO Guam
Pohnpei State	Disaster Management Office (DMO)	Director (Under Governor)	WFO Guam through WSO Pohnpei
Kosrae State	Disaster Management Office (DMO)	Director (Under Governor)	WFO Guam through WSO Pohnpei
Chuuk State	Disaster Management Office (DMO)	Director (Under Governor)	WFO Guam through WSO Chuuk
Yap State	Disaster Management Office (DMO)	Director (Under Governor)	WFO Guam through WSO Yap

The US-affiliated Islands of the western North Pacific have historically received Disaster Recovery and Mitigation assistance from the FEMA, pending a Disaster Declaration by the US President in response to a request for assistance. Beginning in 2008, Guam and the CNMI will continue to receive disaster assistance from FEMA, but disaster assistance for the ROP, the RMI, and the FSM will be provided by the US Agency for International Development (USAID) Office of Foreign Disaster Assistance (OFDA).

The US-affiliated Islands of the western North Pacific employ the following four principles of disaster management: preparedness, response, recovery and mitigation. The mission of each disaster office is to prevent death and injury and minimize the loss of property, effectively employing the above four principles. For the Western North Pacific, the following table details the responsible government agencies for Disaster Management.

## Mission

Although each nation has their own Disaster Management System, each follows the four principles

of disaster management: mitigation, preparedness, response and recovery. The mission of each disaster office is to prevent death and injury and minimize the loss of property, effectively employing the above four principles.

## Mitigation

Mitigation activities are those that eliminate or reduce the damaging effects caused by an emergency/disaster occurrence. Also included are those long-term activities that lessen the undesirable effects of unavoidable hazards. Some examples include establishment and enforcement of building codes, flood plain management, insurance, elevating buildings and public education programs. On Guam and the CNMI, the Hazard Mitigation Plans have been prepared to comply with the Stafford Act and Disaster Mitigation Act of 2000 (DMS 2000). It is based on the Stafford Act, the Interim Final Rules, and related documents. In addition to complying with the legislation, the overall purpose of the plan is to establish a comprehensive hazard mitigation program to reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural

## Disaster Management System

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and human-caused disasters, at island and village levels.

### Preparedness and Training

Preparedness activities serve to develop and enhance capabilities needed in the event of an emergency/disaster. Planning, exercising, training, and developing public information programs and warning systems are among the activities conducted at this phase.

### Response

During a response phase, emergency services during a crisis are provided. These activities help to reduce the loss of life, injuries, damage to the island

resources and expedite recovery efforts. Response activities include, but not limited to; warning and evacuation, search and rescue and other functional operations addressed.

### Recovery

Recovery includes short-term and long-term activities. Short-term recovery seeks to restore critical basic life support systems such as power, water, communications, transportation and medical. Long-term recovery focuses on restoring the affected community to its normal or improved state of affairs prior to the emergency/disaster. The recovery period is an opportune time to establish and implement mitigation measures, particularly those related to the recent emergency/disaster.

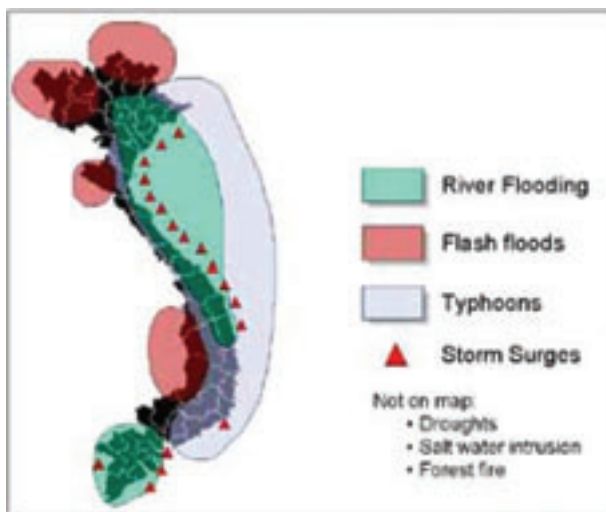




VIET NAM

### Introduction

Vietnam is located in the monsoon tropical region, with total mainland area of 329,241 square kilometer and a coastal line of 3,260 kilometer in length. On average, there is one kilometer of coastal line on every 100 square kilometer. The mainland is shown in Figure A-33 which maximum width is 600 kilometer and minimum width is 50 kilometer.



**Figure A-33. Map of Vietnam with Damaged Area**

Vietnam has a diverse topography with mountains, rivers, highland, plain, coasts, peninsula, and islands. Hilly and highland areas accounts for  $\frac{3}{4}$  of the territory. Whereas plain area only accounts for  $\frac{1}{4}$  of the territory, including Red River plain, Central plain, South Central plain and Mekong River Delta. The terrain is divided by a dense river network. There are 2,360 rivers with over ten kilometer in length and 14 river systems with the valley area of over 3,000 square kilometer, in which 9 river systems with the valley areas of over 10,000 square kilometer including Me Kong river, Red river, Ma river, Ca river, Thai Binh river, Dong Nai river, Ba river, Bang Giang - Ky Cung and Thu Bon river. With these features, Vietnam has frequent expo-

sure to storms, floods and other natural disasters.

Over the past years, natural disasters occurred in all regions in the country and have caused serious losses in terms of lives and property, social, cultural and economic infrastructures and left adverse impact to the environment. In the recent decade from 1997 to 2006, such natural disasters as storms, flood, drought and other disasters have caused huge damage of human and property, in which nearly 7,500 were reported dead and missing. Natural disasters have taken away economic value equivalent 1 to 1.5 % annual GDP. The intensity and recurrent cycle of natural disasters in Vietnam is increasing in an unpredictable manner. Economic growth, population explosion and rapid urbanization have put more pressure and caused degradation of natural resources and environment. Current population of Vietnam is some 85 millions and in a near future, it will be of 100 millions (APEC, 2006). The dramatic increase of population in areas with rich production potentials has led to the shortage of residential and cultivation land areas. This also leads to growing illegal occupation of waterways, river mouths, coast and stream embankments; unorganized exploitation of natural resources and minerals; cutting down forests, forest fires, waste and sewage pressures, etc. These are the main reasons for narrowed waterways, poor land, and pollution, alluvium of reservoirs, sliding of hills and mountains and mud flows, which contribute to new threats of disasters.

Natural disasters in Vietnam are the direct barriers to economic development and sustainable development process, increasing poverty and hampering the efforts to achieve Millennium Development Goals (MDGs). Over 80 per cent of Vietnam population is directly vulnerable to natural disasters.

Natural disasters had occurred and taken away many achievements of the socio-economic development process of the country. During the period of 2002-2006, natural disasters had taken lives of

1,700 people and estimated economic loss of some VND 75,000 billions.

Natural disasters increase the classification of life quality among the population, slow down and hamper poverty reduction processes, especially those in natural disaster prone areas. There are on average millions of people annually in need of relief due to natural disasters. Many of them who had just got out of the poverty situation fell to the poverty trap again. Natural disasters also destabilized social order.

Natural disasters affected education development, deteriorated educational infrastructure, interrupted school attendance of children, especially in mountainous and Me Kong Delta areas; leaving behind numerous adverse impact on the most vulnerable groups like the elderly, the disabled, women and children. Disasters also destroyed and deteriorated habitats, damaged production and lives of communities. Natural disasters have been reducing national reserved resources and destabilize social life.

## Disaster Management system

### 1. Legal bases for establishing the Vietnam Central Committee for Flood and Storm Control

On 19 May 1990, the Council of Ministers (current Government) issued Decree No. 168-HDBT stipulating functions and duties of the Central Committee for Flood and Storm Control (CCFSC) and the Committees for Flood and Storm Control (CFSC) of all levels and sectors. The CCFSC has component such as (i) chairman as the minister of Ministry of Agriculture and Rural Development (MARD), (ii) Standing Deputy Chairman by the Deputy Minister of MARD, (iii) Deputy Chairmen by Deputy Director of Government's Office and Deputy Chief of the General Staff of Vietnamese People's Army, and (iv) Members of CCFSC by the Deputy Ministers of Ministries and Sectors

### 2. Duties of CCFSC

The duties of CCFSC is to assist the Prime Minister in (i) supervising and speeding up and inspecting sectors and localities to implement annual flood and storm control plans; (ii) appointing human resources and means to timely respond to pressing issues; (iii) directing localities to recover consequences caused by floods and storms; and (vi) organizing the flood and storm control, sharing experiences and applying advanced technologies in flood and storm control for localities and sectors

### 3. Functions and duties of Committee for Flood and Storm Control of Ministries and sectors

The Committee for Flood and Storm Control (CCFSC) of Ministries and sectors established by their Ministers and chaired by the Leaders of Ministries and sectors. Duties of these CFSCs are (i) for developing and implementing the flood and storm control plans of their ministries and sectors, protecting materials and facilities, technologies and human resources directly managed by their ministries and sectors; (ii) for managing materials and preserved means to serve flood and storm control and damage recovery according to their managerial functions; and (iii) for providing materials, technologies and means managed by their ministries and sectors to support and respond to emergency events, as appointed by the Central Committee for Flood and Storm Control

### 4. Organization, Function and duty of Committees for Flood and Storm Control of province, district and commune

CCFSCs at all levels are established by People's Committees at all levels. Component of CCFSCs are (i) Chairperson of CCFSCs by the Chairpersons of People's Committees; (ii) CCFSCs Vice Chairperson by the Directors of Departments of Agriculture and

## Disaster Management System

Rural Development; (iii) CCFSCs members by Head or Vice Head of Departments related to flood and storm control at localities. These CCFSCs are to assist their People's Committees in developing and directing the implementation of flood and storm control plans within their areas; protecting dikes and flood and storm control to ensure safety of economic areas and people in their areas; recovering consequences caused by floods and storms.

### 5. Functions and duties of Department of Dike Management and Flood and Storm Control (DDMFSC) under Ministry of Agriculture and Rural Development

#### a. Functions

- Decision No. 26/2008/QĐ-BNN dated on 28/11/2007 stipulating functions, duties, authority and organizational structure of DDMFC under MARD control. The DDFSC is a state management agency for dike issues.
- DDMFC acts as a standing office of CCFSC

#### b. Organizational structure and system

- Director General of DDMFC is a standing member of CCFSC, cum Chief of CCFSC standing office shown in Figure AI-34;
- Deputy Directors General of DDMFC are Deputy Chiefs of CCFSC standing office
- Managerial system: 5 divisions and 2 standing offices including: Flood and Storm Control Division, Administrative Division, Planning ? Planning Management Division; Division of Inspection, and 2 standing offices located in Da Nang and Ho Chi Minh cities
- 2 centers: Disaster Management Center and Dike technical consulting Center

#### c. Duties:

- Review, propose, adjust, advice, direct, inspect, supervise and speed up the implementation of the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020
- Coordinate with relevant agencies to timely pro-

pose to CCFSC the methods for dealing with incidents of water constructions, recover from damages caused by natural disasters

- Implement the operating regulation of inter-reservoirs on Da and Lo rivers to discharge flood water in the low land area

- Advise MARD and the CCFSC on the directing and supervising the implementation of concrete regulations on emergency situations; safe measures for evacuation, production protection and people life, damage recovery...

- Proactively coordinate with sectors and local authorities in flood and storm control. In case of emergencies, it is entitled to request ministries and sectors and local authorities to mobilize resources. Supervise and update information on rains, storms, floods, flash floods, whirlwinds, river bank and coastal line erosion, earthquakes and tsunami within the countries; summarize damages and propose measures for recovery from consequences caused by natural disasters

- Mobilize forces and means in localities to prevent flood and storm, protect dikes and search and rescue as regulations

- Coordinate with the National Committee for Search and Rescue, relevant Ministries, sectors and localities to direct the prevention, search and rescue in order to minimize the damages caused by earthquake and tsunami when it happens

- Direct the management and use of preserved materials for flood and storm control

- Update information on river bank and coastal line erosion, propose, inspect and supervise and speed up the erosion, if any

- Advise the CCFSC on the planning and development of early warning system for tsunami in high-risk areas

- Direct the inspection, statistic and management of database on dike issues and flood and storms control as regulated

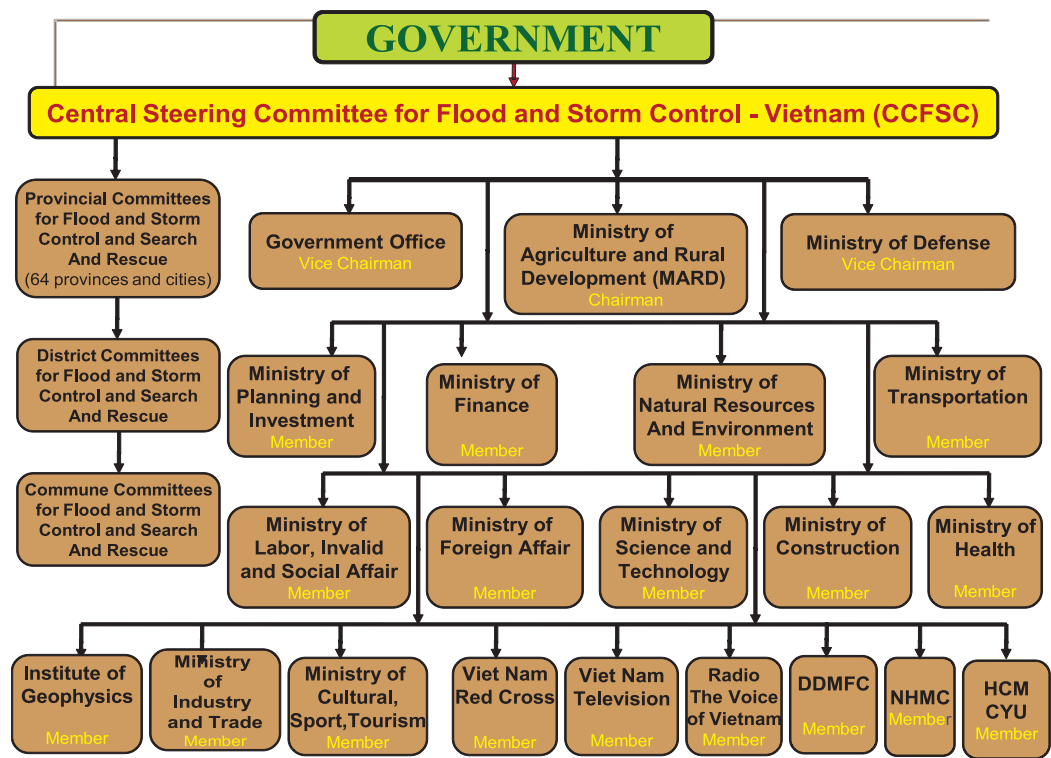


Figure A-34. Organizational structure of CCFSC

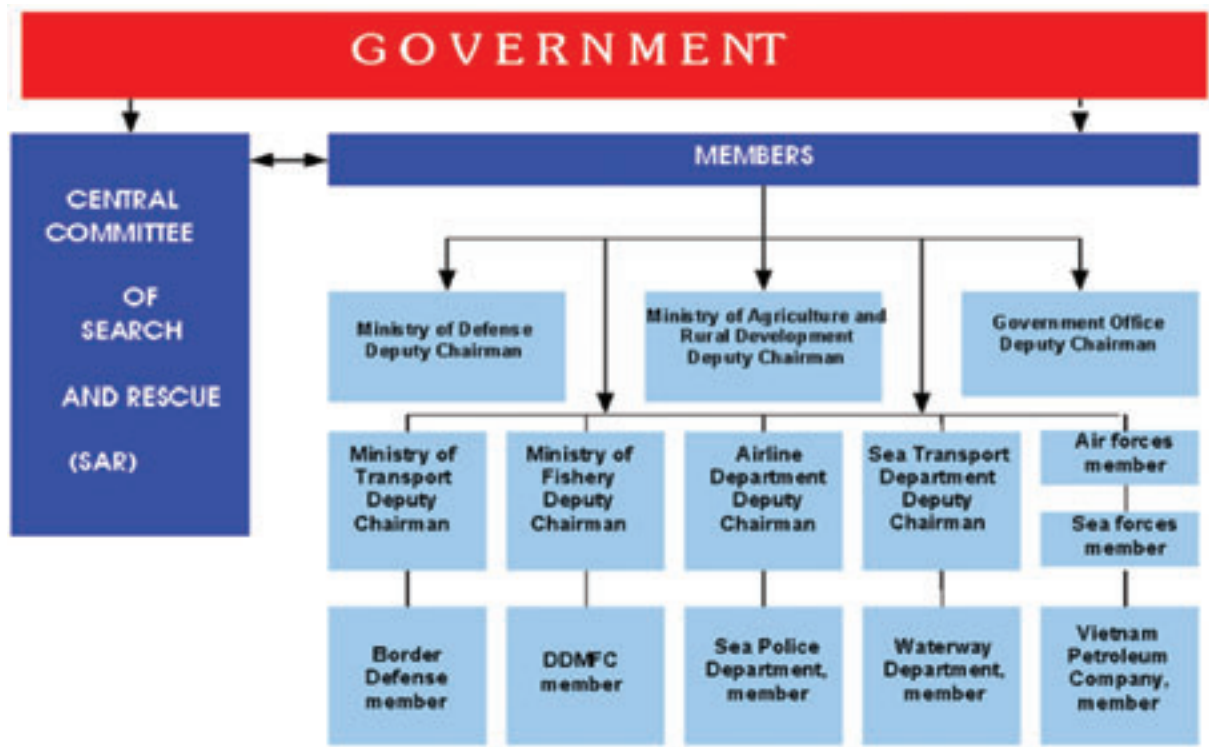


Figure A-35. Organizational Structure of National Committee Search And Rescue



### Disaster Preparedness and Mitigation in Vietnam

The process of disasters preparedness and mitigation in Vietnam is an existence struggle which goes in line with the national resistant and building struggle, especially most serious disasters of floods and storms.

#### 1. Flood and storm preparedness and mitigation process

Two thousand years ago, Vietnamese people mentioned the four disasters of water (flood), fires, robbery, and foreign aggression as people's most dangerous enemies. In the four disasters, flood and fire are natural disasters and robbery and foreign aggression are man-made dangers.

From the Fifth Century A.D, dyke construction for flood prevention began. The Red River Dyke system was completed in 1248. Presently, the Northern Part of Vietnam has a dyke system of 3500-km length, 6-10 m height. Additionally, a north-south coastal dyke system is on the way of completion.

In the Centre as well as in the Mekong River Delta, many dyke portions and outer dykes have been built. Projections for flood and inundation preparedness and strategies for river and sea flood and reservoir disaster preparedness and mitigation were established. These are exploits of Vietnamese people in the struggle against flood and inundation.

From the foundation of the Democratic Republic of Vietnam, flood and storm preparedness and mitigation are considered as the most important task in all development stages. In parallel with maintaining the existing dyke system and building new dyke portions, many structural and non-structural solutions were worked out in an attempt to mitigate disaster damage. Solutions of flood retention and diversion, riverbed dredging, and building reservoir

to regulate flooding are applied in socio-economic areas. In disadvantageous areas, non-structural solutions can be applied, preparedness and mitigation solutions including live-with-flood solution can be applied to mitigate damage without much investment. Non-structural solutions such as changing time of seasonal crop, for example, change the seasonal crop by the summer-autumn crop in the Centre, Central Highlands, and the South. Living with flood is to take advantage of flooding such as extracting alluvium, sanitizing fields, building outer dykes to prevent early flooding to harvest summer-autumn paddy crop, building outer dams for pumping water to sow paddy seeds for early winter-spring and summer-autumn crops that can be harvested in early August, etc.

Organizing safe living conditions, build houses on stilts, pillar houses, floating houses, building high ground for flood avoidance, using life-buoys, and applying scientific achievements in disaster warning and forecasting to provide timely warning to people, etc.

In many generations, Vietnamese considered flood preparedness and mitigation as a responsibility of each people. Each person is obliged to contribute in the dyke building task annually as well as safeguard, and prevent flooding whenever flood occurs. The patrolling and protecting missions are familiar to every Vietnamese.

Since the day of independence, flood and inundation mitigation tasks are closely organized from the central level to provincial, district, and communal levels. There should be combination among sectors, especially the participation of national defense forces in protecting dyke, searching and rescuing, and effectively resolve complex situations.

#### 2. Flashflood Mitigation

Previously, flashfloods often occurs in mountain-



ous and midland areas. Due to scattered distributed population in these areas, the damage caused by disasters was not large so it was not attracted due attention from relevant authorities. In the last few decades, flashfloods are more frequently occurred and caused more losses of people and properties for residences in mountainous towns and township, particularly the flashfloods in Lai Chau Province in 2000 also caused huge damage to residents. Additionally, there were also other flashfloods in the Centre, Central Highlands, and the southeastern areas. It can be said that, flashfloods can occur in every sloping hills with high raining intensity, poor botanical cover, non-absorbed pedological condition due to erosion. Presently, solutions for mitigating damage caused by flashflood are mainly non-structural solutions such as reallocating residences for flashflood avoidance, afforestation, and forest preservation applying cultivation technology on sloping hills, observing rain intensity and quickly reporting disaster situations to people so that they can get ready for response. Nevertheless, due to financial limitation, the organization of study, preparedness, and rearrangement of residences are restricted.

### 3. Inundation preparedness and mitigation

Inundation is caused by heavy rains in plains and low-lying areas in the coastal zones having large tide fluctuation, and in areas having outer dykes for preventing flooding and salt water.

Inundation happens annually on a large scale, mainly causes damage to paddy crops, not to people lives and properties. However, it increased production cost of seasonal crops in the north, summer-autumn crops in the Centre and the South. With the slogan of "inclining field to release water to rivers" in the last few decades, the State of Vietnam remarkably invested in inundation fighting works. More than 70% of cultivated areas are equipped with inundation fighting works of auto-

matic water release or pumping stations. In the northern part, the inundation fighting pumping areas accounted for 51% of the total inundated areas. In plain areas, inundation often occurs in rivers. When flood water level increases, the automatic water release works cannot operate so that the pumping works should be used.

In tide affected areas, tide level can be used to resolve flood water but there should also be sluices. These sluices will be closed when the tides increase and opened when the tides fall. Expenditure for inundation fighting is often higher than that of drought fighting. Thus, the State often offers electric supply.

Today, inundation release level should be ensured at 90 to 95% while the irrigation level at 75% for inundation causes more serious consequences than drought, relating to not only crops but the environment. In low-lying areas, due to high cost of inundation fighting in the seasonal crops, it is necessary to rearrange plantation restructure or utilize special species of rice seeds.

### 4. Drought preparedness and mitigation

Drought often occurs in a large scale in Vietnam. After 50 years of irrigation development, 450,000 ha of paddy area, 80,000 ha of subsidiary crop area, 60,000 ha of industrial area, and 20,000 ha of fishery-breeding area suffered from drought in 1998. 2.35 million people were in short of fresh water and had to pay thousands of billion VND for drought fighting. In areas which the dry season lasts for 7 to 8 months, drought is among dangerous disasters. Terrible disasters happened in the history and left behind its consequences of famine, robbery, and epidemics.

Since the national day of independence, the State of Vietnam has concentrated on hydraulic works, starting with the construction of the Northern Hung

Hai Irrigation University to supply water for 124,000 ha of cultivated area in the northern part. 29 irrigation systems were restored and newly built to supply irrigating water for 680,730 ha of cultivated area, accounting for 71% of the area in the northern part in just 3 decades. Series of reservoirs and pumping stations supplying water for 98,000 ha in the northern mountainous area and 337,558 ha in the central-north were restored and newly built. After the country's reunification, many hydraulic works were built which irrigated 189,671 ha of cultivated area in the central-south, 98,936 ha in the Central Highlands, 93,390 ha in the southeast, and 1,613,000 ha in the Mekong River Delta. Thus, in the disaster mitigation and preparedness struggle, Vietnam invested mostly in three areas: flood fighting, inundation fighting, and drought fighting, remarkably limiting damage caused by these disasters.

### 5. Salt water intrusion preparedness and mitigation

Most of the Vietnam's estuaries and river deltas are often suffered from salt-water intrusion with different levels because the country has such a long shoreline of 3200 km. The serious levels of intrusion depend on water flow in the dry season and effects of tidal fluctuation.

In the Red River Delta and the Thai Binh River Delta, the level of salt water intrusion is 10/00 and penetrates from 6 to 27 km to the mainland on the Thai Binh River, 11 km on the Ninh Co River, 10 km on the Red River, 8 km on the Tra Ly River, and 5 km on the Day River. Thanks to the salt prevention of river dykes and sluices, salt water intrusion phenomenon in the northern part is not really severe.

In the Centre, the salt intrusion level in estuaries is high, about 26 to 280/00. However, the intrusion is not deep. The salt proportion is just 10/00 and the penetration is less than 10 km in the Ma River and less than 32 km in the Ca River. Rivers in the cen-

tral-south mostly have dams or sandbanks at the estuaries, limiting the penetration of salt intrusion. However, salt proportion in the downstream areas of dams are high, of which the lowest level is from 50/00 to 70/00, the highest is from 150/00 to 300/00, causing soil on the riverside of the downstream area to be severely salted, and so is the underground water. Salt intrusion in the Dong Nai River is rather deep, the salt proportion is 10/00 and penetrates 117 km to the mainland on the Dong Nai River, 123 km on the Sai Gon River, 138 km on the Vam Co River. After the operation of the Tri An and Dau Tieng Hydraulic-power Plants, the highest salt level reduce remarkably on the contrary to the duration of the 40/00 salt level. It can be said that salt intrusion phenomenon on the Dong Nai River is relatively severe.

Salt water intrusion in the Mekong River Delta is most complex because the region's land height is lower than 3 m. Because of the large tide boundary in the East Sea, salt water intrusion in the East Sea is deeper than in the West Sea. In the East Sea, the salt intrusion is 40/00 in the Tien River stretching from My Tho to My Hoa and Tra Vinh Provinces. In the Hau River, originating from Dai Ngai Province, salt penetration is 20 to 25 km in the Long Xuyen Quadrangle, 139 km in the Dong Thap Muoi. Nearly 1 million ha of land were affected by salt intrusion, mainly in the Ca Mau Peninsula, the coastal zone of the East Sea, the Long Xuyen Quadrangle, and the west of the Hau River.

Many salt water preventing-fresh water supplying works were built after the country's reunification, remarkably limiting salt intrusion. The highest level of intrusion is reduced and the duration is nearly unchanged.

### 6. Desertification preparedness and mitigation

In Vietnam, the central-south has the lowest annual rainfall. Its average annual rainfall is under 1000

mm, notably under 800 mm in Ninh Thuan and Binh Thuan Provinces. These areas have the potential evaporation volume of 1500 to 1700 mm annually. The evaporation volume of the basins are higher than the annual rainfall. The module of the dry flow of 75% probability is from 0.3 to 17 l/s/km<sup>2</sup>. If the soil and water prevention and botanical cover protection solutions are not applied, the areas will face with desertification danger.

In some coastal zones of the central-centre, there are sandy areas which form sandbanks in the mainland, turning the coastal areas to deserts. These areas have numerous flows in dry months of under 5 l/s/km<sup>2</sup>. Presently, the initial solution being applied is planting sand-preventing trees and builds ecological village on sand to increase the humidity and reduce the evaporation. However, desertification phenomenon in Vietnam is not serious and can be surmounted. The concerning matter now is that there are still more than 10 million ha of wild land and barely hills in the country. If they are not greened, they will soon be severely desertified.

## 7. Whirlwinds and hail rain preparedness and mitigation

Whirlwinds and hail rain often occur in the midland and coastal areas where sudden changes of terrain, temperature radiation, and air pressure take place. Whirlwinds and hail rain often happen on a narrow scale, in a short and sudden period, causing ships sunken, people dead, and damage to crops and houses. To date, there are no effective whirlwind preparedness and mitigation solutions. The forecasting works are also difficult and ships operating offshore cannot avoid whirlwinds even being warned about the disaster. During whirlwind occurrence, it is of equal difficult to anticipate the track of the whirlwind. The only way to mitigate disaster is to prepare for it and organize the relief task. Fishing

boats should be increased its size and equipped with life-buoys. Houses in the vulnerable areas should be strengthened and suitably designed. Traditional forecasting experiences should be applied to early warn thunderstorms, whirlwinds, and storms and avoid risks.

## 8. Storm surge preparedness and mitigation

Storm surges caused sea green house effects changed from 2.5 to 2.7 mm annually. The highest storm surge in the coastal areas of Vietnam was observed at 360 cm in 1989 caused by Storm DAN in Cua Hoi - Nghe An Province. According to the level and the position of the storm, the levels of storm surge will be high or low, the effect of the water level far or near. Typhoons are often accompanied by storm surge occurrences. However, because damage caused by storms and ship sunk is too big and on a large scale, people pay less attention to storm surges and do not split the damage caused by storm surges out from damage caused by storms. Not until in the last few decades, the investigations, study, and surveys on storm surges were taken into consideration. Documents on storm surges are still very limited, especially damage caused by storm surges.

Storm surge levels with the probability of 10% were estimated at 1.7 m to 2.2 m in the North, 2.0 m to 2.3 m in the central-north, 0.6 m to 0.7 m in the central-south. In the southern coastal area, storm surge at Go Cong Province is 0.9 m and in Ca Mau Province is 0.8 m. Storm surges often caused sea dyke breaking, causing salt water intrusion and cause losses of people and properties. Hai Phong, Thai Binh, Nam Dinh, Nghe An, and Soc Trang Provinces are the most hit areas by storm surges. At present, storm surge preparedness solution is to plan mangrove forests to protect banks and alleviate waves and storm surges. Sea dyke building solution is implemented to prevent salt water and storm surges. The current height of sea dykes can

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only prevent storm surge and wave of Level 9 to Level 10 even 12 level. If mangrove forest is restored storm of higher levels can be prevented and sea dykes should not be heightened.

### 9. Forest fire preparedness and mitigation

According to data in 1995 Vietnam has 10.8 million ha of forest, including 9.5 million ha of natural forest and 1.3 million ha of planted forest. By 2010, the area will increase to 15.2 million ha, including 6.9 million ha of protective forest, 1.4 million ha of forest for special utilization, 6.9 million ha of production forest. The proportion of forest cover and perennial trees is 51.9%.

Main reasons for forest fires are slash-and-burn cultivation, burning pasture for livestock breeding, wood exploitation, fire-heating burnt by children, etc. In short, 100% of forest fires are man-made.

Forest fire prevention organization was implemented but not very effective. The tasks of forest fire prevention and fighting has not yet socialized. Fire prevention and fighting is too thin and equipment is too poor. The fire prevention and fighting task is more difficult than the combat against wood exploitation and transportation. Unless the fire prevention and fighting is socialized like the flood and storm mitigation, this task will be effectively implemented.

### 10. Landslide preparedness and mitigation

There are two types of landslides: landslides caused by geographical tectonics relating to ecological variation, and landslides caused by external power on the coastal and on the riverside: water flow, wind, wave, etc. in reference to natural resource exploitation and waste discharge. To date, landslides caused by geographical tectonics just appear in some places but not on a large scale and

causing disaster. Presently, the most popular landslides are caused by sea and riverbank erosion due to changes of water flow and changes of flow regime after building reservoirs. Sudden floods caused by lowering the river water level in the dry season causing reduction of underground water and land cracks. Due to erosion at estuaries and coastal areas, the most serious river erosion is at the Red River where thousands of households were evacuated. The next comes the Tien River in Hong Ngu, Soc Trang, and My Tho Districts which changed the estuaries of Dan Nong- Da Rang, the Thu Bon River, Nha Trang River and coastal erosions in Hai Hau District of Quang Tri Province and Ngoc Hien District of Ca Mau Province. These erosions developed gradually and could be predicted. The difficulty is the arrangement for movement. There are landslides due to natural resource exploitation, inadequate waste discharge and land-fill. The transportation roads through disadvantageous geographical areas or too hilly areas like in Quy Chau, Tra Linh, Cao Bang, Cong Hiep Hoa ? Nghe An areas are also origin of landslides. Besides, annual landslides occurred in the Northern, Central, and Central Highlands, causing transportation blocks in many days.

In short, landslides in Vietnam now mainly caused by water, rain, river water, sea water, and even underground water. Landslide prevention solutions are basically shore protection solutions such as soil-prevented walls, embankments, river and coastal control works, and management of the usage of rivers and coastal areas. However, expenditure for such works is expensive so that the results are limited.

### 11. Reservoir disaster preparedness and mitigation

Presently, there are more than 500 reservoirs of over 1-million m<sup>3</sup> capacity in Vietnam including 6 main huge power generation plants such as Hoa

Binh, Thac Ba, Don Duong (Da Nhim), Tri An, Thac, and Mo Vinh Son Reservoirs. The others are irrigation reservoirs with total capacity of 5.4 billion m<sup>3</sup> of which Dau Tieng Reservoir has the biggest capacity of 1.5 billion m<sup>3</sup>, irrigating nearly 480,000 ha.

Some reservoirs are directly located in populous areas such as Hoa Binh, Thac Ba, Dau Tieng, Tri An, Ke Go, Phu Ninh, Pa Khoang, Cam Son, Nui Coc Reservoirs, etc. Due to shortage of documents on hydro-meteorological data and calculation and design of the former Soviet Union, the designed capacity is low. Floods with higher capacity than designed occurred in Nui Coc and Phuc Ninh Reservoirs. Extended spillways for flood release were designed in many reservoirs. More than 50% of the reservoirs were designed and built in 1976-1990 stage.

Additionally, due to upstream deforestation caused by climate changes and sediment capacity, flood-water seems to increase and affect more dramatically to people. The lack of management on planning and regulations on building stairs in small upstream reservoirs leads to problems in big reservoirs in downstream areas. These shortcomings may cause problems or even unexpected disasters in big reservoirs. Reservoir problems occurred in small reservoirs, in the near future, deteriorated reservoirs will be more and if there are no preparedness solutions, damage will dramatically increase. Annually, improvement and maintenance are undertaken, but there are no comprehensive strategy for reservoir problem preparedness and mitigation.

## 12. Industrial and environmental problem preparedness and mitigation

Industrial problems spring out from industrial production, causing serious consequences to natural and social environment such as: mine collapsing, fires, explosion, radiated air leak, impacting the

community's health, lives and properties. Accidents in construction, railway transportation, waterway, land-way, and airway are considered as industrial accidents.

Environmental problems are consequences of industrial problems and disasters which largely impacted the ecological environment on large scale such as wrecks of oil-tanks, radiation ore ships and plant-protected chemicals, chemical warehouse fires, burying waste which contain radiation substances, non-decayed toxic, over use of plant-protected chemicals causing environmental pollution, fishing by toxic, explosive, and electricity, etc.

In Vietnam, although the industry has not advanced, there is a potential danger of industrial problems. The main reasons are outdated and non-synchronous equipment, low percentage of skilled-workers, low quality of management standard, and industrial disciplines are not strict.

Vietnam has just begun its industrialization and modernization. The country's industry is not well developed and rural industrialization and modernization are initially taken part. Although the industrial and environmental disasters are not popular, they will be pressing problems in the next few decades which will be put on line with flood and storm disasters. It is necessary to strictly manage industrial zones right when they are in the feasible research.

## Regulations relating to disaster preparedness and mitigation

There are five laws relating to disaster preparedness and mitigation in Viet Nam such as Law on Dyke Management, Law on Water Resources, Law on Protection and Afforestation, the Law on Environment Protection, Law on Land Use, the Law on Natural Resources and Minerals, Law on Aquaculture Products, etc. The Ordinance on Flood and



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Storm Control, the Ordinance on Exploitation and Protection of Water Resources Works, the Ordinance of Protection of Hydro-Meteorology Works are together with resolutions to guide on the implementation of these Laws. In particular, 16th November 2007, the Prime Minister approved the National Strategy on Disaster Prevention, Response and Mitigation to 2020 attached with guidelines on the finalization of the Strategic National Action Plan to 2015 (SNAP). This is an important legal foundation to boost up disaster prevention, response and mitigation activities in the coming time.

- Attach importance to strengthen institutional mechanisms, capacity, equipments, material basis for the guidance and leadership of flood storm control and victims rescue from central to local level; enhancing leadership capacity of the Central Committee for Flood Storm Control, National Committee for Search and Rescue, ministerial and local committees for flood storm control; investing to upgrade material basis and capacity of forecasting and early warning; equipment and facilities for search and rescue operations.

- Organize timely and effective relief and recovery activities. Every year the State reserved a certain percentage of budget and necessities for emergency relief to recover rapidly from natural disasters. When disasters happen, political, social organizations like the Vietnamese Fatherland Front, Trade Union, Youth Union and Women Union, etc. are all active in mobilizing donations to support the affected areas to bring the situation back to normal.

- Design and implement socio-economic development programmes relating to flood storm control and disaster mitigation such as: riverhead forest plantation, protection forest, mangrove forest; safe reservoir programme, drought mitigation, Living with Flood programme, safe harbour for boats, reinforcement and upgradation of dyke systems, etc.

- Research and apply science and technology in flood storm control and disaster mitigation, prevention of riverbank/seabank erosion, prevention of extreme flood in Red River Delta; establish the Self-finance Fund; develop model of safe house in natural disasters; post-disaster damage and needs assessment methodology; inundation division in central provinces; planning for flash flood preparedness; applying new technology in forecasting, early warning and disaster management; using new materials and new technology in construction of disaster prevention, response and mitigation infrastructures.

- Strengthen international cooperation through wide and effective participation in regional and international disaster management mechanisms such as Hyogo Framework for Action to 2015, Asian Disaster Reduction Center (ADRC), Asian Disaster Preparedness Center (ADPC); ASEAN Committee for Disaster Management (ACDM); World Meteorology Organization (WMO); Typhoon Committee (TC); Natural Disaster Mitigation Partnership (NDMP), United Nation International Strategy for Disaster Reduction (UN ISDR)

- The Government has created favorable conditions and actively cooperates with international organizations and non-governmental organizations in Vietnam working in disaster risk management such as UNDP, UN ESCAP, WB, ADB, NGOs... Attach importance to propaganda, education and awareness raising for the communities.

### **Overview on awareness and perception of Community base disaster risk management (CBDRM) and CBDRM implementation process in Vietnam.**

In 2007, the Government had approved and issued the National Strategy on Disaster Prevention, Response and Mitigation in Vietnam with the fol-



lowing fundamental perspectives: (i) Disaster preparedness and response include: prevention, response and recovery to minimize adverse impact by natural disasters, ensuring sustainable development and contributing to social stability, ensure national security and defence. (ii) Government offices, economic enterprises, social organizations, military services and all citizens, agencies and foreigners living in Vietnam will be responsible for disaster prevention, response and recovery. (iii) Disaster prevention, response and mitigation will be implemented by the State and the people, making effective use of national resources and mobilizing any resources from communities, organizations and individual inside and outside the country. (iv) Disaster prevention, response and mitigation must be integrated into planning, socio-economic development of each region, sector and the country. (v) Disaster prevention, response and mitigation should take preparedness as the major task, regularly study on the impact of global climate change, sea level rise and extraordinary events of climate for preparation and coping with. (vi) Disaster prevention, response and mitigation should promote and build on traditional experience, document lessons learnt, combine with knowledge and modern technology and strengthen international cooperation.

The National Strategy for Disaster Prevention, Response and Mitigation emphasized the guiding principle in disaster preparedness and response is “4 on-site motto-leadership, human resources, materials and logistics”. The Strategy also pointed out an important task of “Socialization of disaster preparedness and response”, including (i) Create favourable conditions for people to participate in the development of legal documents, planning, management and monitoring the implementation of programmes and projects in local areas. (ii) Foster dissemination activities and community awareness rising. Building capacity for self disaster preparedness, promote the tradition of mutual support in emergency relief operations; Establishment of

community voluntary groups to participate in search and rescue operation. Promoting the role of social organizations in preparedness, response and recovery; Develop the volunteer network to assist in dissemination, mobilization, recovery and rehabilitation of production. Encouraging organizations, individuals inside and outside the country to contribute diverse and effective support for people and localities affected by natural disasters; (iii) Reinforcing training of human resources to meet the requirement of disaster prevention, response and mitigation, especially for disaster management, advisory and coordination offices.

It is recognized that “CBDRM” is new in terms of “terminology” but in practice, this approach has been employed at different levels and in distinctive areas in Vietnam. Deeper research clearly showed that there are common factors between meaning, objective of CBDRM and meaning, objectives, policies and fundamental principles of Vietnamese Government. That is “relying on the people and mainly implemented by the people”, fostering grassroot democracy through implementation of “grassroots democracy regulation”, principles of “Publicize and socialize flood storm control and disaster mitigation” and “4 on-site motto”, “sharing resources and collaborative implementation” such as co-funding by Central government and locality in construction of disaster management infrastructures, laid out legal basis for local institutions “participate in monitoring the construction of disaster management works”, encourage the adoption of “measures and new-technology solutions”.

In this view, there has been both “top-down” and “bottom-up” approaches but at different levels. Some cases are still keen on top-down approach as a result of the centralized planning mechanism in the past years that not only partly obstacle but also need the more time for fully applying the CBDRM approach in some case. However, those principles and mottos have strengthened the responsibility of relevant stakeholders. On the other hand, those

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have mobilized traditional experience, resources and partly ensure the sustainability and effectiveness of disaster management activities.

Government agencies from central to local levels have recognized and positively assessed CBDRM as an effective approach. This has been reflected in disaster management policies, strategies and local authorities have encouraged and created favourable conditions for international and non-governmental organizations in collaboration with local government and technical institutions to implement CBDRM projects in various regions of the country. In 2007, with support of Asian Disaster Preparedness Center (ADPC), CCFSC had collaborated with MARD to develop criteria of emulation and awarding mechanism in flood storm control and disaster mitigation, in which there is an awarding scheme for organizations and individual with exceptional practices in CBDRM. This is an indication of encouraging CBDRM adoption in Vietnam.

Vietnamese Government also confirmed that disaster management strategies should be mainstreamed in socio-economic development process so as to reduce the risks of development setback, environmental pollution, breach of ecosystem balance and escalate disaster risks. Recent programmes and policies indicated that there has been a combination of multi-purposes in some disaster mitigation activities and socio-economic development. Some typical examples are: improving the surface of river and sea dykes as road; construct drainage for irrigation combined with aquaculture production, evacuation to new residential areas linking with promotion of livelihood and flash flood safety; safe harbours for boats, etc.

International and non-governmental organizations have been putting joint efforts to support and promote disaster risk reduction activities. In which, CBDRM has been adopted in different forms and at various levels, from mobilization and policy propaganda to support specific programmes and projects

for disaster preparedness, as well as develop into good CBDRM models for further replication in Vietnam. Specific CBDRM interventions and initial 16 good practice examples have been selected from disaster vulnerable areas in various regions of Vietnam, e.g. in mountainous areas prone to flash flood and land slide, in coastal areas of the Centre prone to typhoons, sea level rise, salty intrusion, river flood, drought and Me Kong River Delta prone to prolonged flood and inundation. Also, there are many other practices applying participatory approach but have not been documented are strong evidence for great support by international and NGO organizations relating to CBDRM in Vietnam.

In a broader context (including both direct interventions and researches) which has direct or indirect link to disaster risk management, community-based concepts and approaches have been initiated and implemented in a number of pilot projects, in which international organizations have worked together with sectors and localities such as “Community Based Environment Management”, “Community Based Agricultural Extension in mountainous districts”, “Participatory Capacity Building for Water Resources Management”, “Community Based Aquaculture Product Management”, “Community- Based Healthcare Development”, “Pilot Community Based Children Protection Network”, etc.

In this regard, participatory approach has gained more and more popularity in Vietnam. In which, community based disaster risk reduction is being paid more attention, extended and has achieved initial results. Awareness and capacity of people and local cadres with regard to hazards, information analysis, self response capacity of people living in the project areas have been significantly improved.

## Recent major disaster Description of recent major disaster and response activities:

**Table A-12. Damage from 2005-2007 in Vietnam**

Dis-type	Killed			Injured			Total-affected			Damage (US'000s)		
	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Flood	197	35	161	33	4	304	22 220	510	2633 540	76 003	6 836	344 382
Storm	61	189	167	120	1,916	305	386	345	543 391	254 245	1 071 796	347 564
Slides	22		32	7		6	075	573	15	515		1 769
Thunder,	28	44	102	85	113	241			2 840	4 411	21 995	4 098
Flash-flood	76	71		18	32		650	31 583		20 398	24 991	
Total	384	339	462	263	2,065	856	408,945	377,666	3,179,786	355,572	1,125,618	697,813

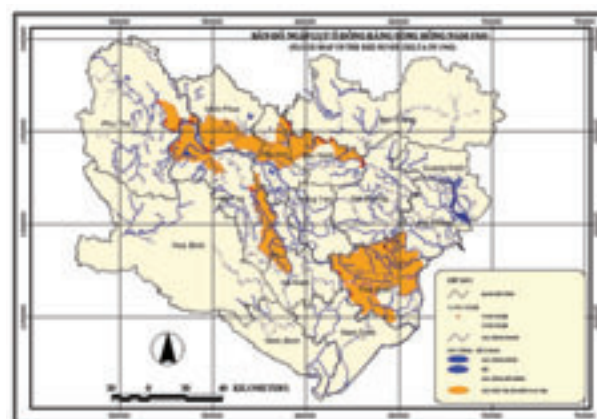
### 1. Historical flood event of 1945 on the Red river system

The extreme flood event occurred on the Red-Thai Binh river system breached 52 dyke sections, inundated 379.803ha of 11 Northern provinces. Over 2 million people were affected with extreme losses that impossible to assess completely. According to statistics recorded in 1946, the losses were estimated at 2 billion dong, equivalent to 14,3 million tones of rice.

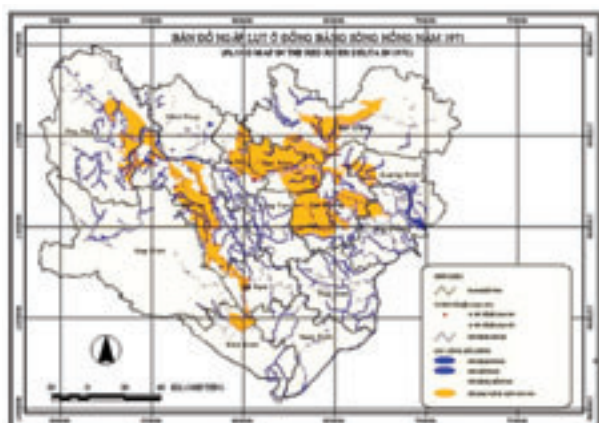
### 2. Historical flood event of 1971 on the Red river system

The historical flood event happened in August 1971 was the most extreme flood on the Red river basin, caused dyke failures in numerous places shown in Figure A-37. The dyke system was seriously threatened: erosion happened in 648 dyke section with total length of 74km, spill and near spill over dyke in 307 sections with length of 415km, boiling wells in

1628 places, termite nest collapse in 265 places, and water leakage in almost the dyke system. Total inundated area was 250.139 ha, of which 162.598 ha totally damaged. Inundation affected 2,71 million of people, caused immediate losses of over 1 billion dong. A number of traffic routes, cities and industrial zones were flooded



**Figure A-36. Flood map of Historical flood event at 1945 on the Red river system**



**Figure A-37. Flood map of Historical flood event at 1971 on the Red river system**

## 3. Flash floods in Lai Chau Province

Flash flood occurred in Nam Coong commune, Sin Ho district, Lai Chau province during October 2000. From the flash flood, 40 people were dead, 17 people were injured, and total damages from flash flood in 2000 were US\$ 140,000.



**Figure A-38. Photo of house damaged from flash flood in 2000**

## 4. Linda Storm 1997

On 2 November 1997 the center of Typhoon Linda

hit the southern tip of Vietnam (the area from Bac Lieu Province to Ca Mau Province) with wind velocities of 75 to 102 km/h (Beaufort Scale 9 to 10). On 3 November 1997, Typhoon Linda moved west and northwest, away from Viet Nam, towards the Gulf of Thailand, at a speed of 20 km/h. From this disaster, 778 people were dead, 2123 people were missed, 1232 people were injured, and total damages from flash flood in 2000 were US\$ 593 million.



**Figure A-39. Figures of damages from Linda Storm in 1997**

## 5. Flooding in Central Vietnam 1999

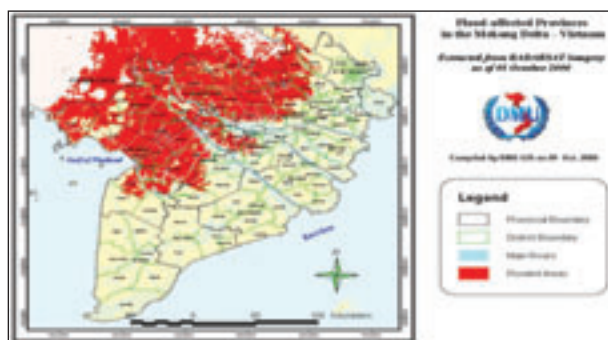
In November 1999, severe floods occurred in the Central Provinces from Quang Binh to Binh Dinh. More than 600 people were killed or reported missing and the value of the loss of property was approx. \$US 300 Million.



**Figure A-40. Figures of damages from Flooding in Central Vietnam**

## 6. Flooding in MeKong River in 2000: In November 2000, the Mekong River Delta suffered the harshest flooding in over 40 years.

By the flooding 481 people were dead and total damages from this flooding were US\$ 280 million.

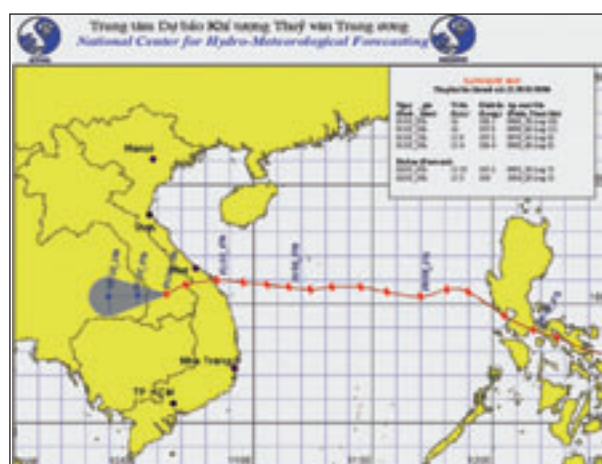


**Figure A-41. Figures of damages from Flooding in MeKong River in 2000**

## 7. Xangsen Typhoon in 2006

The Xangsen Typhoon is one of the most violent typhoon in the last 20 years in Vietnam (Beaufort

scale 12, gusting Beaufort scale 13-14) which was formed in the East sea of the Phillipines (26/9/06) and landed to Da Nang AM 1/10/06 with stable track, intensity and high movement speed (20km/h) shown in Figure 9. From this disaster, 66 people were dead, 2 people were missed, 525 people were injured, and total damages from flash flood in 2000 were US\$ 10.375 billion.



**Figure A-42. The trajectory of the Xangsen Typhoon in 2006**



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