

ASIAN DISASTER REDUCTION CENTER
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Thailand Country Report 2018



ADRC Visiting Researcher

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Contents

1. General Information	4
1.1 Geographical data	4
1.2 Climate information.....	4
1.3 Demographic data	4
1.4 Administrative divisions	5
1.5 Transportation in Thailand	6
1.6 Economic	7
2. Disaster in Thailand	8
2.1 Disaster Statistical Data.....	8
2.2 Disaster Risk Areas	15
2.3 Disaster Seasoning Calendar in Thailand.....	19
2.4 Recent Major Disasters	20
3. Thailand Disaster Management System.....	233
3.1 Disaster Risk Management Mechanisms.....	233
3.2 Emergency and Incident Management	30
3.3 Department of Disaster Prevention and Mitigation	355
3.4 National Disaster Warning Center	377
3.5 Early Warning Systems	388
4. Legal Framework and National Disaster risk Management Plan	411
4.1 Legal Framework.....	411
4.2 National Disaster risk Management Plan (2015).....	422
5. International Cooperation	477
5.1 Partnerships with International bodies/agencies	477
5.2 International Frameworks and Guidelines.....	477
6. Recent Projects on Disaster Risk Reduction	488
6.1 Flood Prevention Project	488
6.2 One-Tambon-One-Search and Rescue Team (OTOS).....	488
6.3 Disaster Management Training.....	488

6.4 Community-Based Disaster Risk Management (CBDRM) Program.....	488
6.5 “Mr. Warning” Training Program	499
6.6 Emergency Response Team Development Project (ERT)	499
6.7 Development of Civil Defence Volunteer Network Program	499
7. Counterpart of ADRC	50
8. References	511

Thailand

1. General Information

1.1 Geographical data



The kingdom of Thailand lies in the heart of Southeast Asia, has a land area of 513,120 sq.km. It is bordered by Myanmar (West & North), Laos (North & East), Cambodia (Southeast), and Malaysia (South). The Thai coastline stretches for 3,219 km along both the Gulf of Thailand on the Pacific side, and the Andaman Sea on the Indian Ocean side. The highest point in Thailand is Doi Inthanon, at 2,565 meters (8,415 feet). The lowest point is the Gulf of Thailand, at sea level.

Thailand is divided into four regions; the North, the Central or the Chao Phraya River Basin, the Northeast or the Korat Plateau and the south or the Southern Peninsula. The northern region terrain is mountainous which render this region to be prone to water-related disasters such as flashflood, landslide and debris flow. The northeastern region is an arid area on Korat Plateau and frequently suffers flashflood and inundation during rainy season, severe drought and cold spell during summer and cool season. The central region, the vast fertile land which is dubbed as the "Rice Bowl" of the country often encounters the repeated riverine flood and urban inundation during the rainy season. The southern region terrain is hilly on the west coast and the coastal plain on the east. This part of Thailand has occasionally frequented flashflood, mudslide, tropical storm and forest fire.

1.2 Climate information

Thailand enjoys a tropical climate with three seasons: hot (March-May), rainy with plenty of sunshine (June-September) and cool (October-February). Temperature during the time of the Congress is approximately 28°C (80°F) (CHARIYAPHAN, 2012)

1.3 Demographic data

Population Total 66,188,503 (in 2017), about 32.4 million males and 33.7 females. (Department Of Provincial Administration, 2018)

People 75% Thais, 11% Chinese, 3.5% Malays, and others are Mons, Khmers, Burmese, Laotians, Indians and a variety of hill tribes.

Language Thai is the national language. English is widely understood in Bangkok and big cities.

Religions: Buddhist (official) 93.6%, Muslim 4.9%, Christian 1.2%, other 0.2%, none 0.1% (2010 est.) (Central Intelligence Agency, 2017)

1.4 Administrative divisions

Thailand is a constitutional monarchy under the beloved king, King PHUMIPHON Adunyadet passed away in October 2016 after 70 years on the throne; his only son, WACHIRALONGKON Bodinrathepphayawarangkun, ascended the throne in December 2016. Thailand's current Prime Minister is Gen. PRAYUT Chan-ocha, was appointed prime minister in August 2014.

The country comprises 76 provinces (changwat, singular and plural) and 1 municipality* (maha nakhon); Amnat Charoen, Ang Thong, Bueng Kan, Buriram, Chachoengsao, Chai Nat, Chaiyaphum, Chanthaburi, Chiang Mai, Chiang Rai, Chon Buri, Chumphon, Kalasin, Kamphaeng Phet, Kanchanaburi, Khon Kaen, Krabi, **Krung Thep* (Bangkok)**, Lampang, Lamphun, Loei, Lop Buri, Mae Hong Son, Maha Sarakham, Mukdahan, Nakhon Nayok, Nakhon Pathom, Nakhon Phanom, Nakhon Ratchasima, Nakhon Sawan, Nakhon Si Thammarat, Nan, Narathiwat, Nong Bua Lamphu, Nong Khai, Nonthaburi, Pathum Thani, Pattani, Phangnga, Phatthalung, Phayao, Phetchabun, Phetchaburi, Phichit, Phitsanulok, Phra Nakhon Si Ayutthaya, Phrae, Phuket, Prachin Buri, Prachuap Khiri Khan, Ranong, Ratchaburi, Rayong, Roi Et, Sa Kaeo, Sakon Nakhon, Samut Prakan, Samut Sakhon, Samut Songkhram, Sara Buri, Satun, Sing Buri, Sisaket, Songkhla, Sukhothai, Suphan Buri, Surat Thani, Surin, Tak, Trang, Trat, Ubon Ratchathani, Udon Thani, Uthai Thani, Uttaradit, Yala, Yasothon.

The provinces are divided into 878 districts (amphoe), 7,255 rural administrative subdistricts (tambon), 74,965 villages (mooban).

Types of government administrations are the central, provincial and local.

Local government is based on the principles of decentralization and self-government when certain legal conditions are met. Under the 1997 constitution, elected local assemblies and elected or appointed local administrative committees were allowed four-year terms. Central government officials could not serve as local officials. Bangkok is a provincial-level entity with an elected governor and the legislative Metropolitan Administration Council. Supervision of provincial and local government takes place through the Department of Local Administration of the Ministry of Interior.

1.5 Transportation in Thailand

Thailand has five types of transport by Rail transport, Road transport, Air transport, Water transport and Pipe transport. (Wikimedia Foundation, Inc., 2017)

Rail transport

The State Railway of Thailand (SRT) operates all of Thailand's national rail lines. Bangkok Railway Station (Hua Lamphong Station) is the main terminus of all routes. Phahonyothin and ICD Lat Krabang are the main freight terminals.

As of 2014 SRT had 4,043 km (2,512 mi) of track, except the Airport Link, all of it meter gauge. Nearly all is single-track (3,685 km), although some important sections around Bangkok are double (251 km or 156 mi) or triple-tracked (107 km or 66 mi) and there are plans to extend this.

Road transport

Thailand has 390,000 km (242,335 miles) of highways. According to the BBC Thailand has 462,133 roads and many multi-lane highways. As of 2017 Thailand has 37 million registered vehicles, 20 million of them motorbikes, and millions more that are unregistered.

Air transport

As of 202, Thailand had 103 airports with 63 paved runways, in addition to 6 heliports. The busiest airport in the country is Bangkok's Suvarnabhumi Airport.

Major international airports

- Suvarnabhumi Airport (BKK) (New Bangkok International Airport, a major international hub)
- Don Mueang International Airport (DMK) (Old Bangkok International, now used mostly by low-cost carriers)
- Chiang Mai International Airport (CNX)
- Mae Fah Luang International Airport (CEI)
- Hat Yai International Airport (HDY)
- Phuket International Airport (HKT)
- Krabi International Airport (KBV)
- Samui International Airport (USM)
- Surat Thani International Airport (URT)
- Udon Thani International Airport (UTH)
- U-Tapao International Airport (UTP)

Water transport

River and canal transport

In Bangkok, the Chao Phraya River is a major transportation artery, with ferries, water taxis (the Chao Phraya Express Boat) and long-tailed boats. There are local,

semi-express, and express lines for commuters, though the winding river means trips can be much farther than by bus. There is also the Khlong Saen Saeb boat service, which provides fast, inexpensive transport in central Bangkok

Merchant marine fleet

As of 2010 Thailand's merchant marine fleet consisted of 363 ships (1,000 GRT or over) totaling 1,834,809 GRT/2,949,558 tonnes deadweight (DWT). By type this includes 31 bulk carrier, 99 cargo ships, 28 chemical tankers, 18 container ships, 36 liquified gas vessels, 1 passenger ship, 10 passenger/cargo ships, 114 petroleum tankers, 24 refrigerated cargo ships, 1 roll-on/roll-off, 1 other passenger vessel.

1.6 Economic

With a well-developed infrastructure, a free-enterprise economy, and generally pro-investment policies, Thailand historically has had a strong economy, but it experienced slow growth in 2013-15 as a result of domestic political turmoil and sluggish global demand, which curbed Thailand's traditionally strong exports - mostly electronics, agricultural commodities, automobiles and parts, and processed foods. Following the May 2014 coup d'etat, tourism decreased 6-7% but is beginning to recover. The Thai baht depreciated more than 8% during 2015. (Central Intelligence Agency, 2017)

Thailand faces labor shortages, and has attracted an estimated 2-4 million migrant workers from neighboring countries. The Thai Government in 2013 implemented a nationwide 300 baht (roughly \$10) per day minimum wage policy and deployed new tax reforms designed to lower rates on middle-income earners. The household debt to GDP ratio is over 80%.

Agriculture - products: rice, cassava (manioc, tapioca), rubber, corn, sugarcane, coconuts, palm oil, pineapple, livestock, fish products

Industries: tourism, textiles and garments, agricultural processing, beverages, tobacco, cement, light manufacturing such as jewelry and electric appliances, computers and parts, integrated circuits, furniture, plastics, automobiles and automotive parts, agricultural

GDP (purchasing power parity): \$1.229 trillion (2017 est.) \$1.161 trillion (2016 est.) \$1.125 trillion (2015 est.)

2. Disaster in Thailand

2.1 Disaster Statistical Data

Due to its geographical location, Thailand has been highly exposed and vulnerable to natural disasters caused by hydrometeorological hazards such as floods, landslides, storms, droughts, etc. The major disasters that had occurred and claimed hundreds of lives as well as causing significant material loss in Thailand during the six – years period are delineated as follow. (DDPM, 2015)

(1) Flood

In general, floods are most often caused by torrential downpours or accumulated precipitation over the long period. These rain events will eventually trigger flash flood or sudden flooding, and overbank flow and inundation. Floods have been the most frequented natural disaster in Thailand and have imposed tremendous hardships for households, claimed hundreds of lives and caused heavy damage to public and private property. The main causes of floods in Thailand are the influence of the following weather phenomena; southwest monsoon which prevails over the Andaman Sea and Thailand's land mass during May till September, northeastern monsoon which prevails over the Gulf of Thailand and southern region ; monsoon through and the elongated region of relatively low atmospheric pressure pass across northern, northeastern and central regions as well as tropical cyclone (tropical storm, tropical depression and typhoon). And in the recent years, the floods have been exacerbated and more severe and devastating as well as inflicting heavier tolls of losses as shown in Fig. 2.1 The great flood of 2011 was Thailand's most catastrophic flood, 64 out of its 77 provinces including Bangkok, a total of 5,247,125 households or 16,224,304 people were affected ; the death toll reached to 1,026 people and total economic damages and losses stood at 1.44 billion Baht (US\$ 45.7 billion approximately).

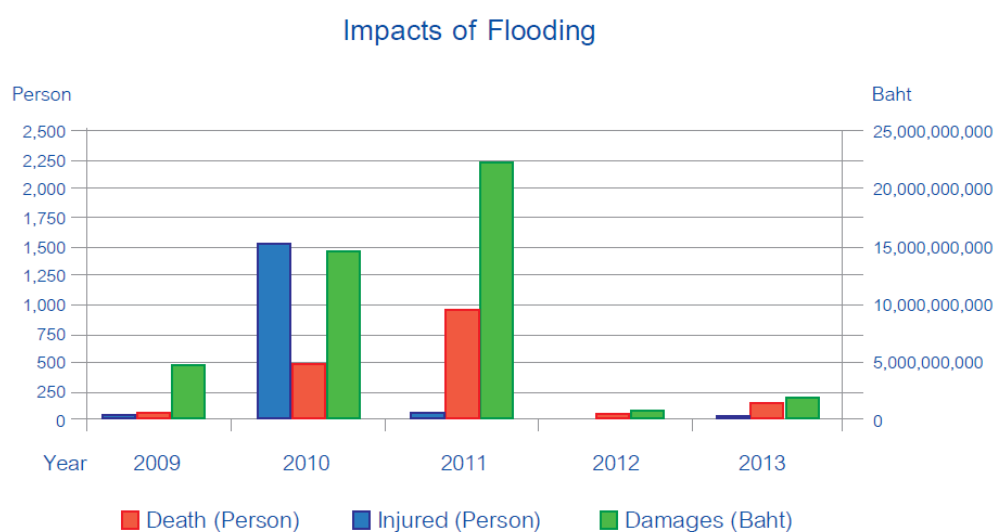


Fig. 2.1 Statistical Data on Impacts of floods during 2009 – 2013

(2) Drought

The phenomenon of drought occurs as the consequence of the sharp decrease in the amount of rainwater, water stored in reservoirs or other natural water sources, or in the underground water level over the period of time, to the extent that it has resulted in the lack of sufficient water supply to meet the demands of humans and animals and for vegetation. This subsequent drought induced shortages of water for domestic consumption and for industrial and agricultural purposes in any area for an extended of time can have significant and widespread impacts on people and communities as well as causing extensive damage to overall economy of the country. In addition, the global phenomenon such as climate change or the long – term change of weather over the period of time has shorten the rainy season or in other words it has prolonged the dry season, thus most of the upper parts of Thailand have received consistently below average precipitation, and further has caused the abrupt and unusual decrease in storage within Thailand's major reservoirs. This phenomenon has subsequently brought about the lack of sufficient available water resources to meet the demands of water usage for domestic and agricultural purposes particularly in the unirrigated areas. Moreover, the simultaneous and rapid pace of modernization, urbanization, and industrialization will inevitably be resulted in an increasing demand for water and decreased supply.

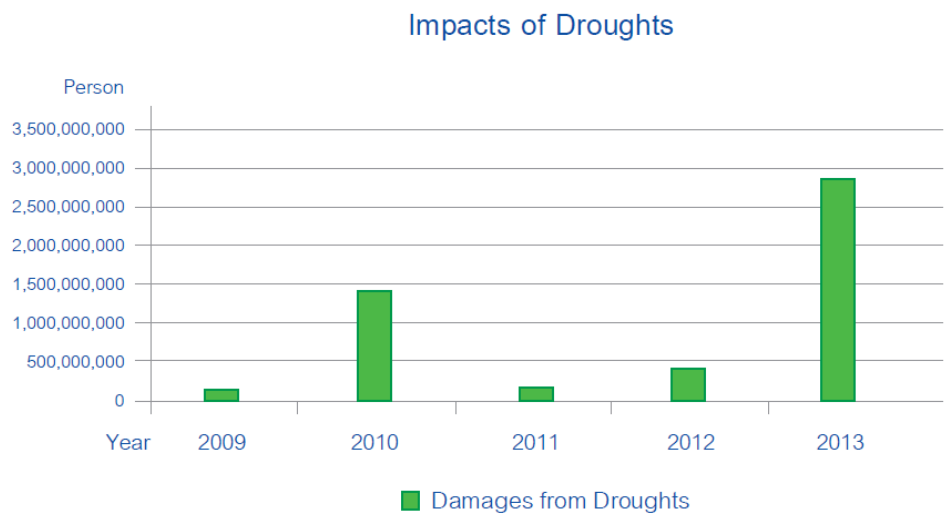


Fig. 2.2 Drought Damages Statistics during 2009 – 2013

(3) Landslides

Generally, a landslide occurs simultaneously with or following the flash floods created by the continuous heavy downpours which have saturated and destabilized the land mass in such areas. Eventually, the aforesaid land mass and rocks move down a slope under the influence of gravity. At present Thailand has experienced an increasing occurrence and intensity of landslides due to diversified preconditions and contributing factors particularly the

anthropogenic activities including deforestation, cultivation of cash crops in a sloping area, destruction of a land's surface, etc.

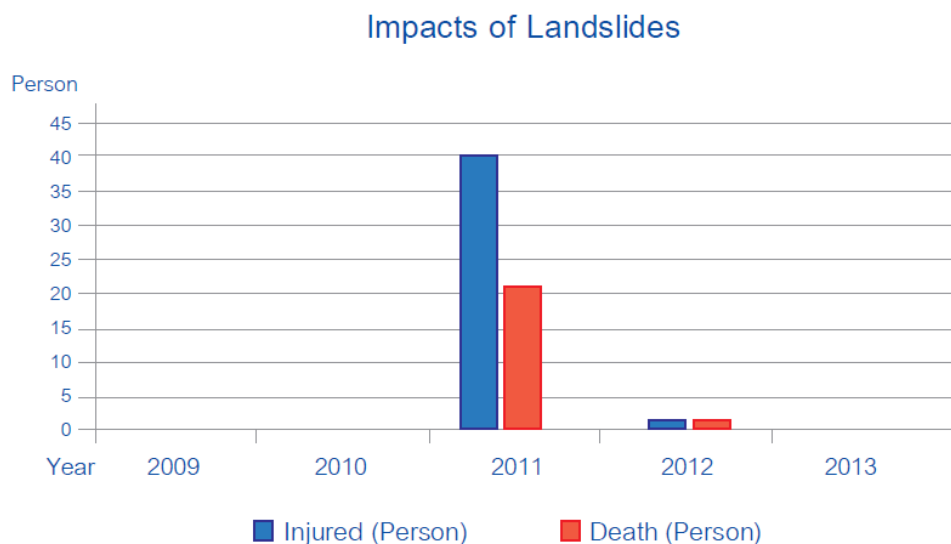


Fig. 2.3 Landslide Statistics during 2009 – 2013

(4) Earthquakes and Tsunami

Earthquakes are common natural disasters that can cause widespread and catastrophic destruction, mass casualty, and many social and economic disruptions. The primary effect of earthquake is the violent ground motion over the period of time, triggered by the sudden movement of the plates where the earth's crust lies on, particularly at a location of plate boundaries or the fault zones. Recently, Thailand has more often experienced earthquakes triggered by the active faults either in the country or in the neighboring countries, particularly the northern and western regions which sit directly above an active tectonic faults. The very recent examples included, inter alia, an occurrence of a magnitude 6.3 earthquake in Chiangrai Province on 5 march 2014 and has produced hundreds of aftershocks. This earthquake inflicted considerable damage to houses and other property of the people. In addition, the undersea megathrust earthquake can triggered the deadly and massive waves of destruction known as tsunamis. These powerful walls of water can travel far away from their source at very high speed, and upon approaching shore they slow down but grow in size. With their divesting force, tsunamis can cause tremendous loss of life and extensive destruction to property along the shoreline of inhabited areas as had happened in the coastal communities of Thailand's southern provinces along the Andaman Sea rim in 2004 where the death toll reached 5,395 and 2,817 missing.

(5) Storms

Storms can be referred to as an atmospheric disturbance manifested in strong wind accompanied by rain, or other precipitations, or as a wide with a speed from 89 – 102 kilometers per hour according to Beaufort scale. Storms can cause a great deal of damage to homes and other structures as well as considerable loss of life. The damage caused by storms will vary according to their wind flow velocity and intensity. If the storm is categorized as a depression it will produce the torrential rains accompanied by floods, and incase a depression deepening into tropical cyclone or typhoon it's accompanied phenomena such as torrential rains, floods, and storm surges. Tropical cyclone can inflict the destructive impact on wide area as wide as hundreds of square kilometers (particularly the area located on or nearby its path), and coupled with its aforesaid accompanied phenomena can cause high number of injuries and fatalities as well as tremendous material damage as shown in Pic 2.5

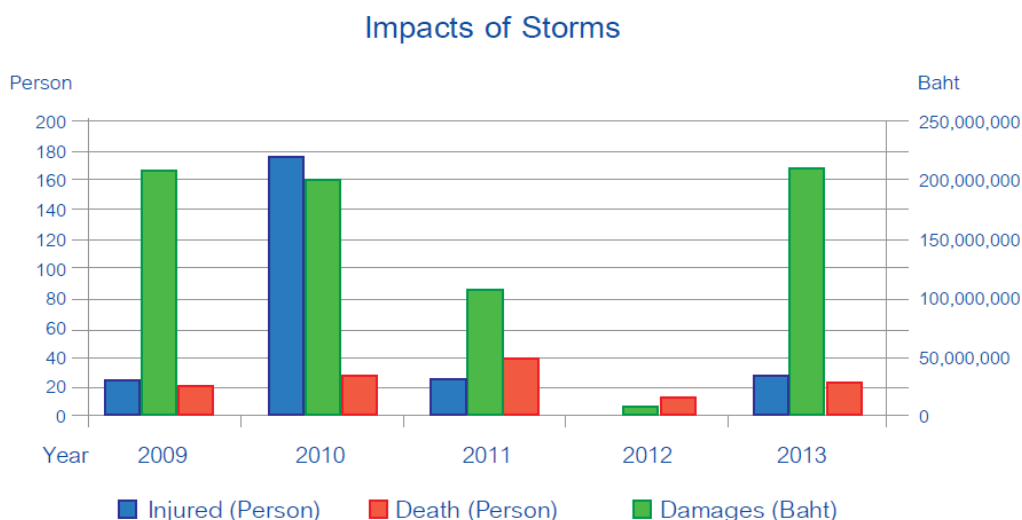


Fig. 2.5 Storm Statistics during 2009 – 2013

(6) Fires

Fire outbreaks or incidents of fire have so far been the most common disaster. Fire is a sources of heat energy that serves a lot of useful purposes as long as it is under control. But once it goes out of control, the radiant heat will quickly ignite surrounding flammable fuels and allowing the fire to continuously spread to everywhere the sources of fire present. And if the raging fire cannot be contained, it will rapidly grow and extend and exacerbate an already bad situation. In case of fuel – driven combustion or a case where large amount of fuel vapor has been released, the more intense the fire will be in term of heat output. The substances easily catching fire or inflammable substances include fuels, chemical substances, or any other flammable liquids, solids or gases what can promptly initiate spontaneous combustion

when ignited by flame or heat, or induce a combustion automatically, Fig. 2.6 illustrates fire losses in the past five years.

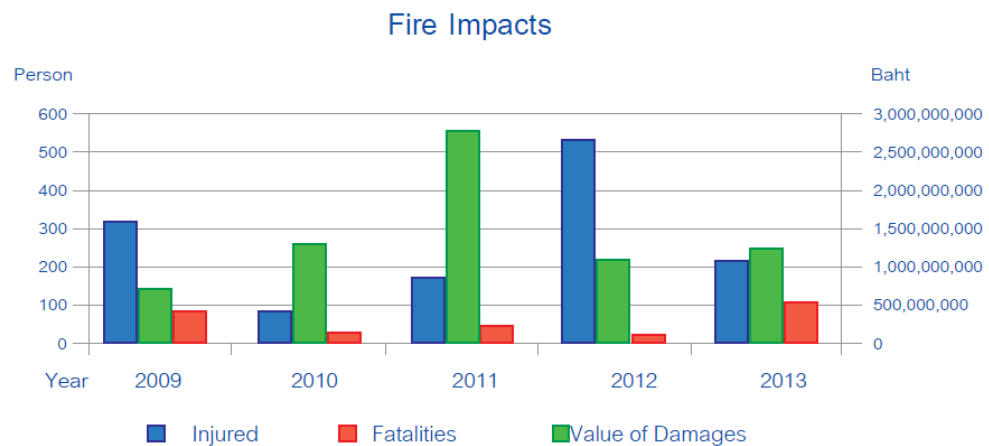


Fig. 2.6 Fire Statistics during 2009 – 2013

(7) Forest Fires and Haze

Forest fire is an enclosed and freely spreading combustion that consumes the natural fuel of forest, that is, grass, weeds, brush and trees. At present, Thailand has experienced more intense and larger forest fires than in the past, thus, becoming a factor that has severely disrupted the balance of ecosystem. Forest Fire has enormously generated impacts on flora and fauna, soil properties and water sources including human life and property as well as on social, economic and tourism activities. In addition, forest fire can cause toxic blanket of haze taking a serious toll on people's health and livelihood in a widespread manner. An example of this phenomenon, among others, includes temporary shutdown of Mae Hongson airport due to the thick haze from forest fire obscured visibility. Fig. 2.7 illustrates Forest Fire damages during 2009 – 2013

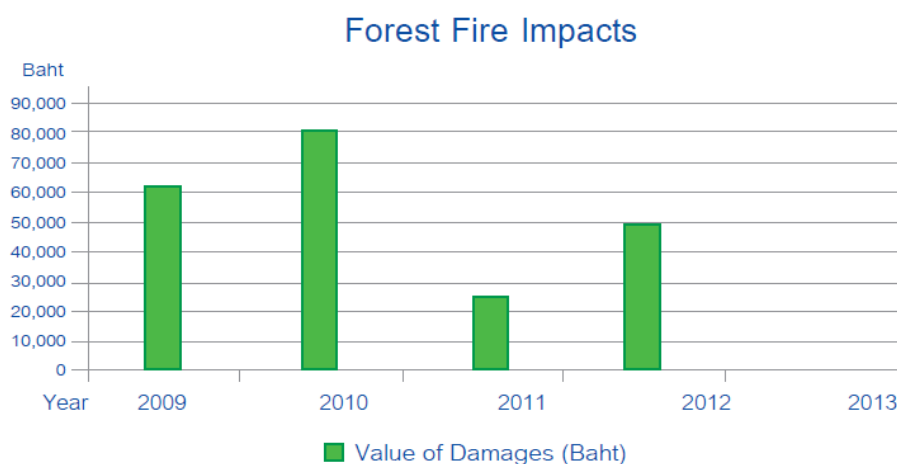


Fig. 2.7 Forest Fire Statistics during 2009 – 2013

(8) Transportation Hazards

The continuing economic and social development in Thailand, in turn has brought about unintended and undesirable consequences including, inter alia an increasing trend and exacerbating of road traffic accident to the extent that it has become one of the highest ranking causes of fatalities among Thai population Besides, road traffic accidents have inflicted an economic burden on the family of the deaths or injuries and a society, the medical costs, the national human capital resource loss, etc. One of official report concluded that road traffic accidents have accounted for 90 percent of overall transport incidents. Most common causes of road traffic accident in Thailand include reckless driving, violation of traffic regulations, drunk driving, not wearing safety helmet on motorcycles, unsafe condition of vehicle and road, and unsafe environmental conditions. In this connection, Ministry of Public Health of Thailand revealed that approximately 14,000 people were killed in road traffic accident each year, or 21.96 deaths per 100,000 population or about 1,166 deaths per month on average. Fig. 2.8 illustrates statistics on loss of life and property damages associated with road traffic accidents during 2009 – 2013

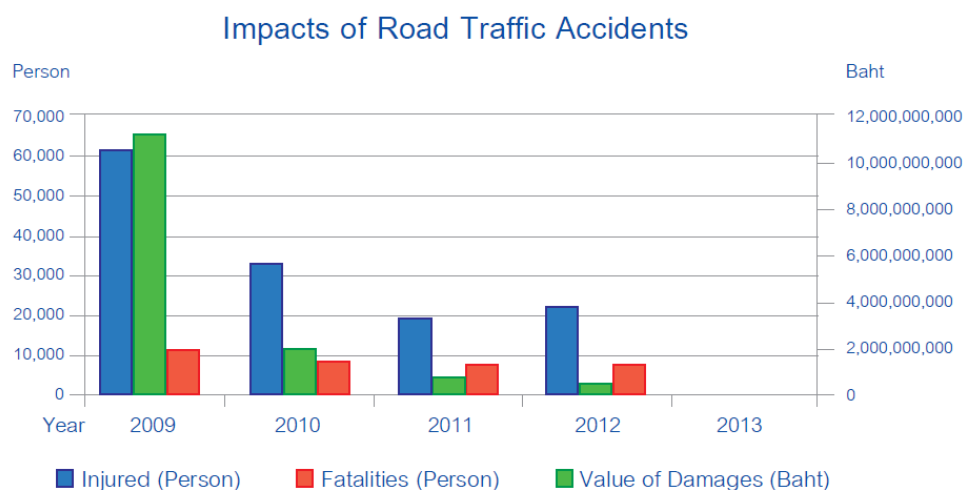


Fig. 2.8 Road Traffic Accident Statistics during 2009 – 2013

(9) Contagious Disease

Disease outbreak is an occurrence of more cases of a disease than would be expected in a community or region during a given time period. A disease diffusion occurs when a disease spreads from its original source to nearby locality and beyond. Over the last few decades, there have been a number of continuous outbreaks of contagious disease including an emerging infectious diseases caused by newly discovered pathogenic agent that has caused an outbreak in human or infectious disease found in new localities such as AIDS, SAR, Avian Influenza, Ebola hemorrhagic fever, etc; and a re – emerging infectious disease

or an infectious disease that was brought under control and recently has begun to resurge as health problem such as chikungunya virus disease, plague, etc. Nevertheless, the emerging and re – emerging infectious disease outbreaks will occur on a periodic basis, and there may be a potential risk of large – scale transboundary disease spreading across the border from neighboring countries.

Year	Type of Infectious Disease	Year	Types of Infectious Disease
2004	Avian Influenza	2012	Dengue Hemorrhagic Fever
2009	Influenza A (H1N1)	2013	Middle East Respiratory Syndrome ;MERS – CoV
2000 - 2001	Chikungunya virus Disease	2014	Ebola

2.2 Disaster Risk Areas

The followings are hazard maps for likelihood and impacts of major natural disasters in Thailand:

Flood Hazard

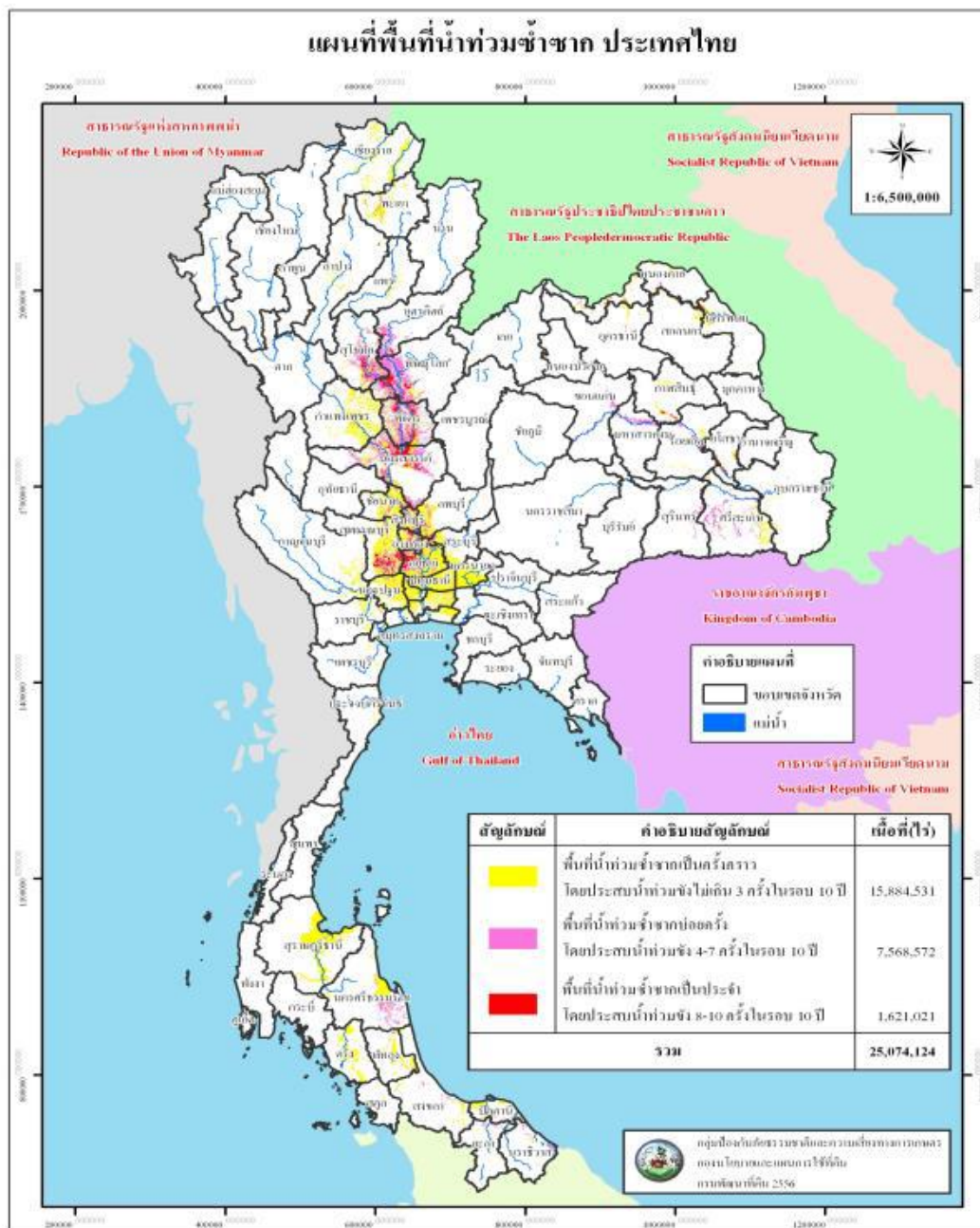


Fig. 2.9 Flood Hazard Map

Drought Hazard

แผนที่พื้นที่แหล่งข้าซากประเทศไทย ปี 2556

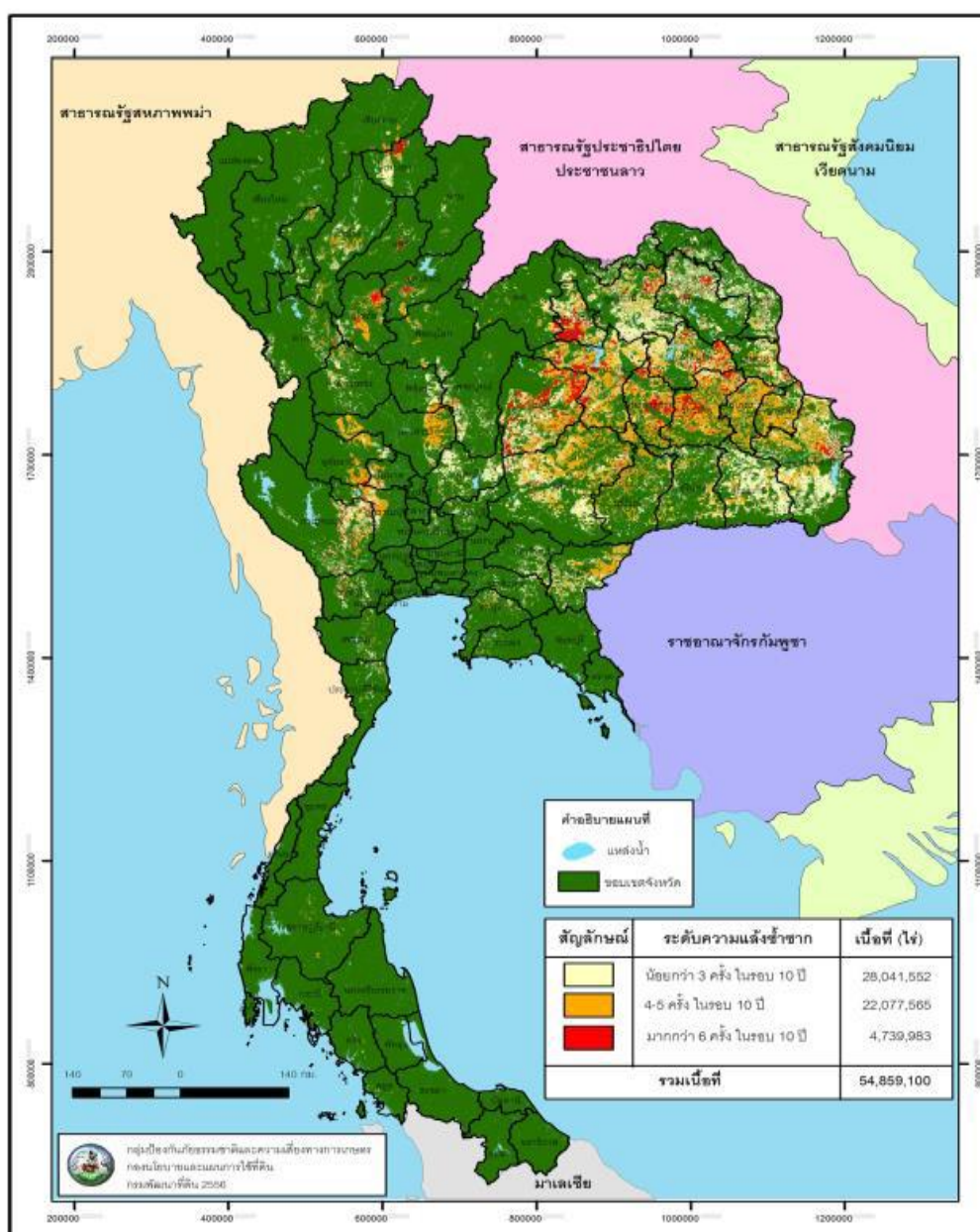


Fig. 2.10 Drought Hazard Map

Seismic Hazard

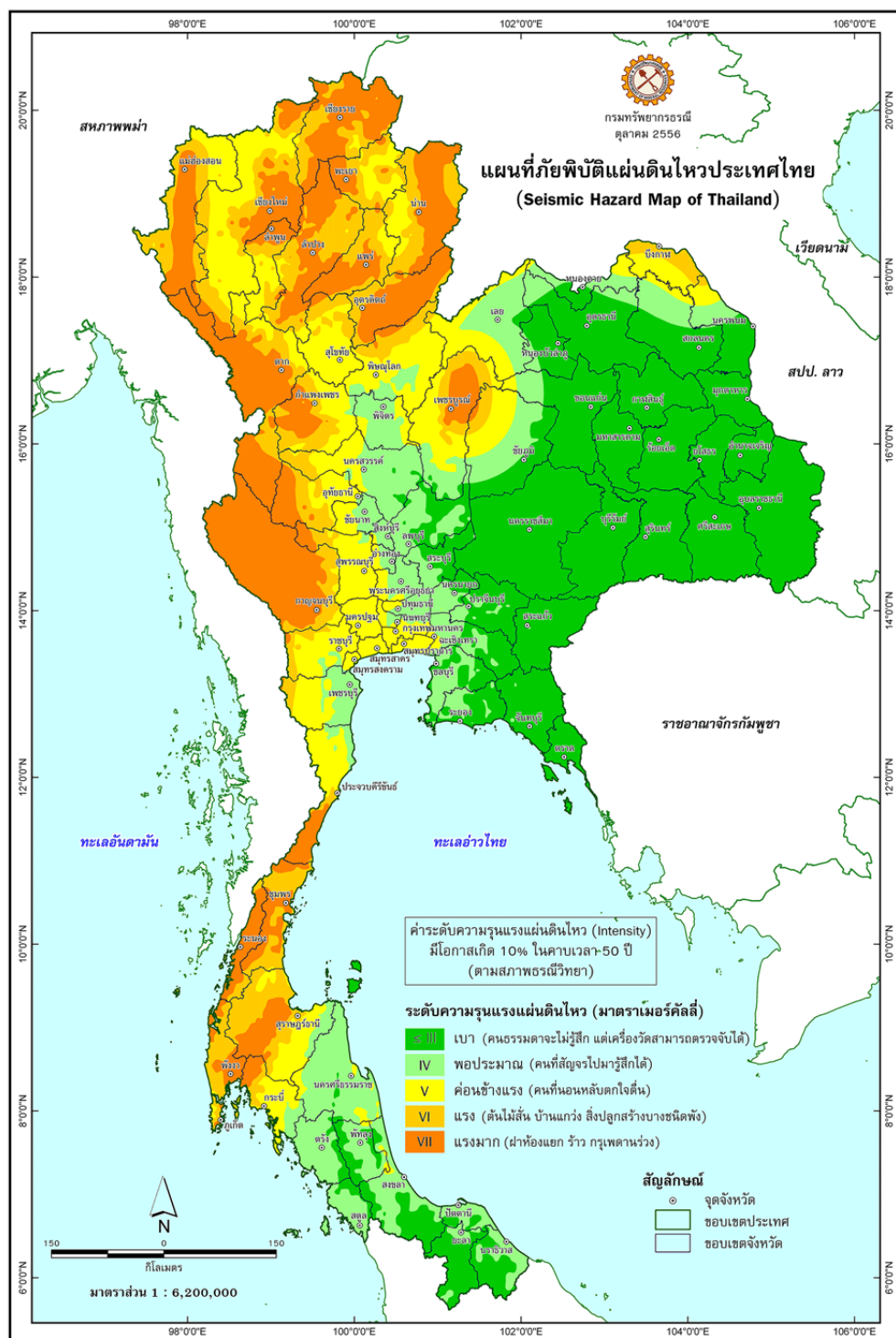


Fig. 2.11 Seismic Hazard Map

Landslide Hazard

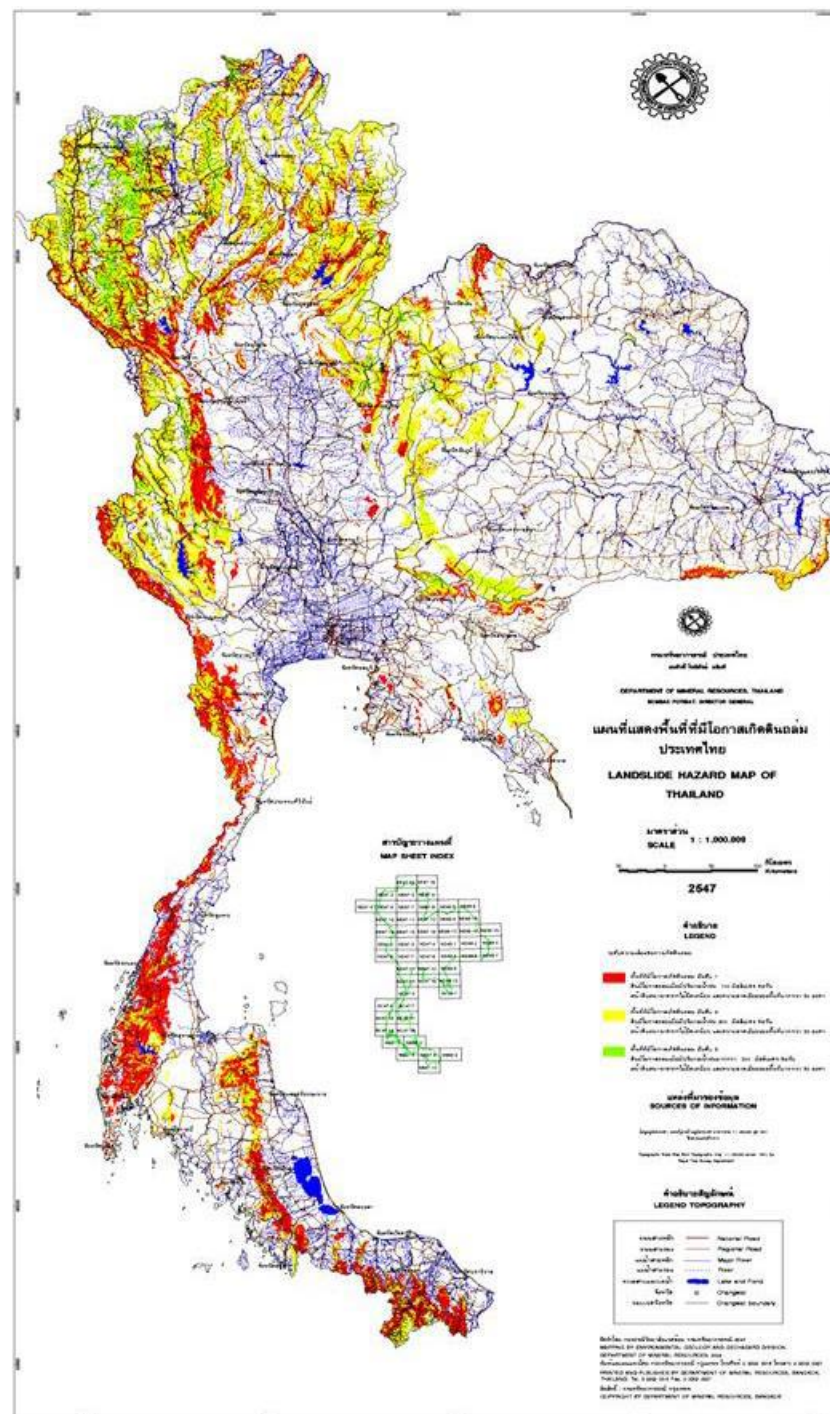
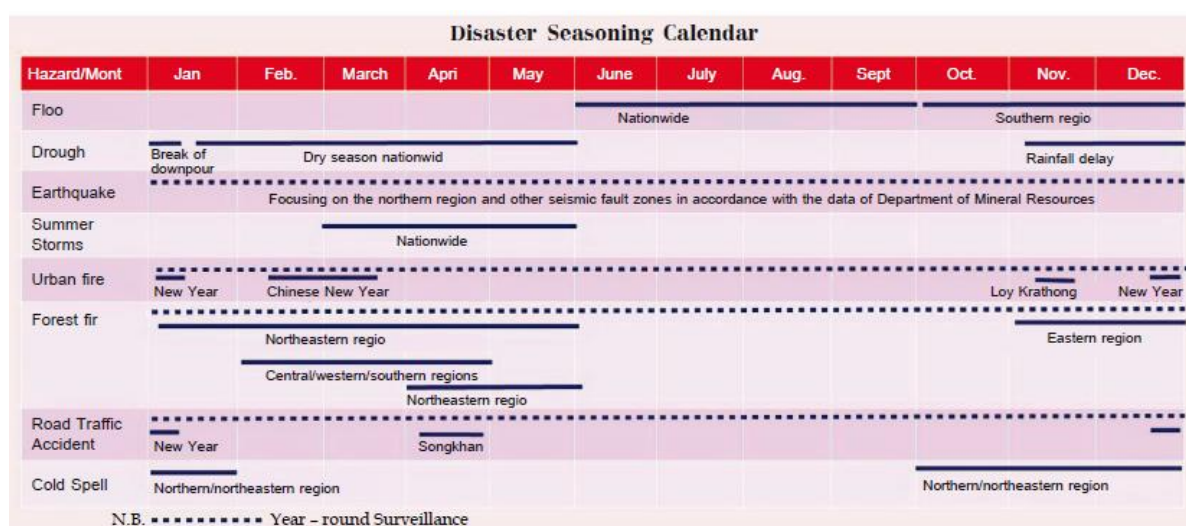


Fig. 2.12 Landslide Hazard Map

2.3 Disaster Seasoning Calendar in Thailand

Over the past decades, the same hydro – meteorological disasters such as floods, storms, droughts, etc. have frequently and repeatedly occurred during the same period of time. Subsequently, the government agencies have sufficient time to predict the imminent onset of these hazards and to put in place countermeasures to reduce their impacts or to prevent the preventable losses. Meanwhile, the climate change impacts have led to the occurrence of unprecedented natural disasters and/or the natural disasters, many of which are exacerbated by climate change and their trends and likelihood becoming less predictable such as earthquakes, coastal erosion, tsunamis, landslides, epidemic, etc. Moreover, road traffic accidents which are considered to be human – induced disaster are unfortunately and extremely common. Since road traffic accidents are mainly caused by wrong driving habits and human errors and are year – round phenomenon, the single event of an incident is almost impossible to predict its likelihood of occurring. Notwithstanding, periods when the traditional festivals and events are held nationwide, all roads will have higher accident probabilities.

Fig. 2.13 Disaster Seasoning Calendar in Thailand



2.4 Recent Major Disasters

2019: Tropical Storm “PABUK”, since 3rd to 6th January 2019, The storm has affected 23 provinces in southern and eastern namely Nakhon Si Thammarat, Pattani, Surat Thani, Songkhla, Narathiwat, Chumporn, Trang, Phatthalung, Ranong, Krabi, Yala, Satun, Phuket, Phangnga, Phetchaburi, Prachuap Khiri Khan, Chanthaburi, Trat, Chon Buri, Rayong, Samut Sakhon, Samut Songkhram and Samut Prakan.

The storm has impacted 23 provinces, 113 Districts, 574 Sub-districts, 3,837 villages and affected 265,353 households and 884,642 people. Damages have been reported to 5 deaths and 2 injuries.

2018: Flooding, since 26th May to 25th October 2018, continuous heavy rain influenced by tropical storm SON TINH and tropical storm BEBINCA have caused a widespread flooding in several provinces in northeast northern southern eastern and central region. The flood has affected 43 provinces namely Kanchanaburi, Tak, Chingmai, Maehongson, Pijit, Nakornsawan, Trat, Prae, Petchaboon, Pitsanulok, Prachuap Khiri Khan, Ranong, Phetchaburi, Lampang, Nan, Uttaradid, Aumnart Chareon, Payoa, Chiangrai, Kalasin, Nakorn Panom, Mookdaharn, Ubon Ratchathani, Bueng Kan, Sakonnakorn, Roi Aed, Yasothorn, Nongkai, Phangnga, Surat Thani, Chumporn, Nakhon Nayok, Chaiyapoom, Prachin Buri, Saraburi, Lopburi, Chachoengsao, Satun, Phuket, Nong Bua Lam Phu, Krabi, Trang, and Lamphun.

The floods have impacted 43 provinces, 263 Districts, 1,018 Sub-districts, 5,684 villages and affected 127,820 households and 389,476 people. Damages have been reported to 8 people were confirmed dead.

Landslide in Nan, 28th July 2018, heavy rain in many areas have impacted 6 houses in Bo Kluea District, Nan Province. Damages have been reported to 8 people were confirmed dead (2 males 6 females).

2017: Flooding in eastern region, since 5th July to 15th August 2017, continuous heavy rain influenced by tropical storm TALAS and tropical storm SONCA have caused a widespread flooding in several provinces in eastern and some area in northern and central region. The flood has affected 44 provinces namely Nakornsawan, Chainart, Jantaburi, Petchaboon, Nan, Pranakorn Sri Ayuthaya, Uthaithani, Kampangeth, Chiangrai, Chingmai, Angthong, Trat, Ranong, Chaiyapoom, Pijit, Uttaradid, Payoa, Nontaburi, Pitsanulok, Saraburi, Lioe, Ubon Ratchathani, Khonkaen, Mahararakham, Prae, Maehongson, Prachuap Khiri Khan, Srisaket, Nakorn Ratchasima, Lopburi, Lampang, Kalasin, Burirum, Sakonnakorn, Sukothai, Mookdaharn, Chumporn, Aumnart Chareon, Roi Aed, Udonthani, Yasothorn, Nongkai, Nakorn Panom, Surin.

The floods have impacted 44 provinces, 302 Districts, 1,724 Sub-districts, 14,105 villages and affected 609,425 households and 1,898,322 people. Damages have been reported to 44 people were confirmed dead.

2016 – 2017: Flooding in southern region, since 1st December 2016 to 12th February 2017, continuous heavy rain influenced by low depression and the strong northeast monsoon have caused a widespread flooding in southern region. The flood has affected 12 provinces namely Phatthalung, Narathiwat, Yala, Songkhla, Pattani, Trang, Suratthani, Nakhon Si Thammarat, Chumphon, Ranong, Krabi, and Prachuap Khiri Khan. The floods have impacted 12 provinces, 129 Districts, 835 Sub-districts, 6,307 villages and affected 587,544 households and over 1.8 million people. Damages have been reported to 99 people were confirmed dead, 4,314 Places of roads, 348 bridges, 126 weirs, 2 reservoirs, 165 government facilities, 2,336 schools and 98 mosques.

The Minister of Interior decided to raise the level of emergency and incident management to level 3 (Large scale disaster) on 5th January 2017 and set up a front line emergency operation and coordination center in Suratthani province within DDPM regional office. Activation of the National Disaster Command Centre; where the Minister of Interior is appointed as the Incident Commander, is established at DDPM Headquarter.

2011: Widespread flooding, the principle cause of the 2011 flooding in Thailand was exacerbation of the La Niña phenomenon, which caused the rainy to materialize sooner than usual, with an accumulation of rainfall extending from January through October that was 35 percent greater than the average. During mid-2011 Thailand was also hit by five tropical storms originating in the South China Sea (Haima, Nockten, Haitang, Nesat and Nalgae). Flash flooding impacted every region of Thailand. Deforestation in many parts of the country, the declining efficiency of the flood management infrastructure and the changes in land use patterns exacerbated the situation. The plan for diverting floodwater to rivers and channels to the east and west of the Chao Praya Rivers, which flow down through the center of Thailand to the gulf of Thailand proved inadequate. In addition, private construction of water barriers reduced the exist for the massive volume of flood water. The central region experienced the most prolonged period of flooding among regions. Uncoordinated management impeded the flow of water to the Gulf of Thailand. The flooding damaged large areas of agriculture land, and factories had to close or move operations elsewhere.

Flooding affected 65 of 76 provinces including Bangkok Metropolitan Administration (BMA). Thailand flood 2011 made economic and social impacts were seven industrial loss, 90 percent of damages and losses from the floods were private sector. Flood effected (JULY 25, 2011-JAN, 2012) effected People 13.6 million in 4 regions, loss of Life 813, loss of Job 400,000 people, economic Damage 46.50 billion USD.

2010: The 2010 Thai floods were a series of flash floods that hit different areas in Thailand. Separate but related floods began in the Northeast and Central Thailand (6 region definition) early October due to abnormally late monsoon moisture over the Bay of Bengal, overflowed the Chao Phraya where the rivers meet, and affected Bangkok, and in the South were triggered by a tropical depression about 2 weeks later, and was later aggravated by related La Niña monsoon rains. Although flooding is a common and annual occurrence in this part of the world, a combination of inadequate drainage and having a higher than average rainfall in the month of October and November 2010, catching the nation unprepared and led to disaster. The death toll in the country stands at 232 people. According to the Thai government data the floods nearly affected 7 million people in more than 25,000 villages, mostly by destruction of property, livelihood and infrastructure.- The government announced that 38 provinces have been hit by floods from October 1 until November 13 and waters have receded in 8 provinces leaving 30 provinces still affected including 12 in the southern region of the country.

2009: Land slide and mudslide occur frequently due to the influence of monsoon, heavy rain in northern which are mountainous including the south.

Flood and landslides 5 provinces in northern (Uttaradit Sukhothai Phrae Lampang Nan) Dead 88 Missing 29 in 22 May 2009

2008: Cyclone Mekkhala hit between 31 September and 1 October 2008. The cyclone caused torrential rains which killed 32, affected 2,864,484 and whose total loss was US\$ 21.6 million.

2007: Cyclone Lekima hit Thailand between 4 and 6 October 2007 killed 17, affected 1,552,936, and whose total loss was US\$ 30.8 million.

2004: The Indian Ocean Tsunami, December 2004: the Most Catastrophic Disaster in Thai at 07.58 a.m., of 26 December 2004, the massive earthquake magnitude of 9.0, the strongest in the world since 1964, struck deep under the Indian Ocean off the west coast of Sumatra, Indonesia, and triggered the cataclysmic tidal wave that slammed on the Andaman coastal provinces, southern Thailand. The catastrophic incident devastated 6 provinces namely, Phuket, Trang, Phang Nga, Krabi, Ranong and Satun. Six Provinces had effected. Devastated Area had 6 provinces 25 districts/sub – districts, 95 Tambons and 407 villages. Death total 5,395 Thai 1,975 and foreigner 2,245.

The Royal Thai Government, private sector and NGOs, have continuously launched restoration activities to enhance livelihoods and rebuild the environments of the affected people and areas following the initial phase of rescue and humanitarian relief. Simultaneously, has conducted preparedness activities so as to reduce the vulnerability and increase the resilience in the tsunami hit communities. The international communities, NGOs and United Nations mechanisms also continue to endlessly support Thailand in these humanitarian assistance activities.

3. Thailand Disaster Management System

3.1 Disaster Risk Management Mechanisms

3.1.1 At Policy Level

(1) National Disaster Prevention and Mitigation committee

This committee has been tasked with the following functions, among others, to formulate national disaster management policy; integrate public – private partnerships for the development of efficient and affective disaster management system, etc.; as stipulated under the provisions of Article 6 and 7 of Disaster Prevention and Mitigation Act B.E. 2550 (2007).

(2) National Safety Council

The main functions of this council are, among others, to propose the national safety policy; propose practice guidelines and has a responsibility to undertake inter – agency coordination. The composition and functions of this council have been set out in the Prime Minister’s Office Regulation on National Safety B.E. 2538 (1995), and addendum.

3.1.2 At Operational Level

(1) National Disaster Command Headquarters

As a national command and control facilities this headquarters has responsibilities to direct, oversee, and coordinate the emergency management practices of all lower disaster management centers. The Minister of Ministry of Interior has been designated as the National Incident Commander, and the Permanent Secretary for the Ministry of Interior to be the Deputy National Incident Commander.

In case of large – scale incident management (level 3), the Minister of ministry of Interior will assume the role and responsibility of National Incident Commander, whilst in case of catastrophic incident management, the Prime Minister or the Deputy Prime Minister whom assigned by the Prime Minister will assume the National Incident Commander’s role and responsibility.

(2) Disaster Management Centre

Department of Disaster Prevention and Mitigation is required to set up the Central Disaster Management Centre, and the Director – General of this Department has been designated as the Central Incident Commander. Its functions and authority are set forth as follows:

(2.1) In a non-emergency situation: Coordinates and integrates the emergency response information, resources, and plans of all relevant government agencies in order to ensure the overall state of readiness for handling any type of potential disaster.

(2.2) Likelihood of disaster: Undertakes full scale preparation for potential response operations, keeps a close watch on the disaster situation, conducts data analysis and rapid situation assessment, disseminates early warning message as well as reporting and providing recommendations to the National Incident Commander as the Prime Minister as the case may be for the purpose of making decisions related to disaster relief and emergency response operations to be jointly conducted by all participating agencies in a coordinated and seamless manner.

(2.3) During a disaster: Directs, integrates, and coordinates the joint response operations for small – (level 1) and medium scale (level 2) disasters. In this context, the Central Disaster Management Centre is required to take responsibilities for directing, conducting disaster situation assessment and providing technical support and assistance to the National Incident command Headquarters ; keeping a close watch on the disaster situation and disseminating early warning message; and providing information and recommendations to the National Incident Commander for the purpose making any decision on raising the level of the disaster incident to level 3 (large – scale incident), and to the Prime Minister or to the Deputy Prime Minister whom assigned by the Prime Minister in case of the upgrade to level 4.

Nevertheless, the Central Disaster Management Center is required to continue acting as the constituent part of in the Emergency Response Coordination Centre under the National Disaster Command Headquarters in case of the upgrade to level 3 and level 4.

(3) Provincial Disaster Management Centre

This centre has been tasked to direct, control, provide support for and coordinate disaster risk management efforts within the respective provincial jurisdiction. In this connection, the provincial governor has been designated as the Provincial Incident Commander, the vice – provincial governor whom assigned by the provincial governor and chairman of the provincial administrative organization have been designated as Deputy Provincial Incident Commanders. The administrative component of this centre has been designed as follow:

Provincial Disaster Management Centre

Administrative Staff

1. Provincial governor	Commander
2. Assigned vice – governor	Deputy Commander
3. Chairman of provincial administrative organization	Deputy Commander
4. Commander of.....provincial police	Committee
5. Assigned representative from Ministry of Defence	Committee
6. Deputy Governor	Committee

7. Provincial chief medical officer	Committee
8. Representative from government agency appointed by the provincial governor	Committee
9. Representative from educational institution located in the respective province appointed by the provincial governor	Committee
10. Representative from charitable organization appointed by the provincial governor	Committee
11. Director of Disaster Prevention and Mitigation Regional Center	Committee
12. Chief of Disaster Prevention and Mitigation..... Provincial Office	Committee/Secretary

N.B.: Committee member is subject to change as considered appropriate by the provincial governor.

Functions and Authority

- a) Develop the District Disaster Risk Management Plan and other relevant plan for the purpose of directing, coordinating, and providing support for disaster management efforts of the local administrative organization, in accordance with the Provincial Disaster Risk Management Plan.
- b) Set forth guidelines to be observed by District and Local Administrative Organization Disaster Management Centres in specific locality in undertaking disaster risk management and disaster preparedness activities as well as in undertaking post – disaster recovery interventions.
- c) Monitor, and conduct disaster situation analysis and assessment. When a disaster actually occurs or is very likely in its jurisdiction, this centre is required to make recommendations to the District Incident Commander in the context of setting up the District Emergency Operation Centre to take responsibility for the command and control of incidents.
- d) Collect data and establish data bank of disaster related resources required to carry out disaster risk management activities within district jurisdiction.
- e) Perform other functions and responsibilities as assigned by the provincial governor or the Provincial Disaster Management Centre.

(4) Bangkok Metropolitan Disaster Management Centre

This centre has been tasked to direct, control, and coordinate disaster risk management efforts within its jurisdiction; to develop action plan based on its vulnerability and exposure to specific hazards in line with the Bangkok Metropolitan Disaster Risk

Management Plan; as well as providing technical assistance support for implementation of disaster risk management activities and functioning as emergency response unit when an actual disasters occur within its jurisdiction. The governor of Bangkok Metropolitan Administration, as the Bangkok Metropolitan Incident Commander has been tasked to perform duties and responsibilities as stipulated in item (3) of Disaster Prevention and Mitigation Act B.E. 2550 (2007). All this, the administrative component as well as duties and responsibilities of this centre will be subject to the governor of Bangkok Metropolitan Administration approval.

(5) District Disaster Management Centre

As a district command and control centre, it has been tasked to direct, provide support for and coordinate disaster management efforts of local administrative organizations located in its jurisdiction, as well as performing any function as assigned by the provincial governor or by the Provincial Disaster Management Centre. The chief district officer has been designated as the District Incident Commander, and the administration component has been designed as follow

District Disaster Management Centre

Administrative Staff

1. District chief	Commander
2. Deputy district chief	Deputy Commander
3. Superintendent of police station in district locality	Committee
4. Assigned representative from Ministry of Defence	Committee
5. District chief medical officer	Committee
6. Executives of local administrative organization in district locality	Committee
7. Representative of the chief officer of the government agency affiliated to central administration department located in district locality	Committee
8. Representative from state agency appointed by district chief	Committee
9. Representative from educational institution appointed by district chief	Committee
10. Representative from charitable organization working in district locality appointed by district chief	Committee
11. Deputy district chief for district security affairs	Committee/ Co – Secretary

12. Representative from Disaster Prevention and Mitigation..... Provincial Office	Committee/ Co - Secretary
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N.B. : Committee member is subject to change as considered appropriate by district chief.

Functions and Authority

1.Develop the District Disaster Risk Management Plan and other relevant plan for the purpose of directing, coordinating, and providing support for disaster management efforts of the local administrative organization, in accordance with the Provincial Disaster Risk Management Plan.

2.Set forth guidelines to be observed by District and Local Administrative Organization Disaster Management Centres in specific locality in undertaking disaster risk management and disaster preparedness activities as well as in undertaking post – disaster recovery interventions.

3.Monitor, and conduct disaster situation analysis and assessment. When a disaster actually occurs or is very likely in its jurisdiction, this centre is required to make recommendations to the District Incident Commander in the context of setting up the District Emergency Operation Centre to take responsibility for the command and control of incidents.

4.Collect data and establish data bank of disaster related resources required to carry out disaster risk management activities within district jurisdiction.

5.Perform other functions and responsibilities as assigned by the provincial governor or the Provincial Disaster Management Centre.

(6) Pattaya City Disaster Management Centre

As Pattaya City command and control centre, it has been tasked to direct, provide support for, and coordinate disaster management efforts of Pattaya City as well as functioning as emergency response unit during an actual disaster, along with developing Pattaya City Disaster Management Action Plan in line with the Provincial Disaster Risk Management Plan and the District Disaster Risk Management Plan. In addition, this Centre has been tasked to provide support and assistance to the Provincial Incident Commander and the District Incident Commander as being assigned, including provision of assistance and support to the neighboring or adjacent local administrative organizations related to the implementation of disaster management activities upon their requests. The mayor of Pattaya City has been designate as the Local Government Incident Commander

(7) Municipal Disaster Management Centre

As a municipal command and control centre, it has been tasked to direct, provide support for, and coordinate disaster management efforts of the respective municipality as well as functioning as emergency response unit during an actual disaster, along with

developing the Municipal Disaster Risk Management Action Plan in line with the Provincial Disaster Risk Management Plan and the District Disaster Management Plan. In addition, this centre has been tasked to provide support and assistance to the Provincial Incident Commander and the District Incident commander as being assigned, including provision of assistance and support to the neighboring or adjacent local administrative organizations related to the implementation of disaster risk management activities upon their requests. The municipal mayor has been designated as a Local Government Incident Commander.

N.B.: Category of Municipality in Thailand

1. City municipality
2. Town municipality
3. Subdistrict municipality

(8) Subdistrict Administrative Organization Disaster Management Centre

As a subdistrict administrative organization command and control center, it has been tasked to direct, provide support for, and coordinate disaster risk management efforts of the respective sub – district as well as functioning as emergency response unit during an actual disaster, along with developing the Subdistrict Disaster Risk Management Action Plan in line with the Provincial Disaster Risk Management Plan and the District Disaster Management Plan. In addition, this Centre has been tasked to provide support and assistance to the neighboring or adjacent local administrative organizations related to the implementation of disaster management activities upon their requests. The chairman of subdistrict administrative organization has been designated as the Local Government Incident Commander.

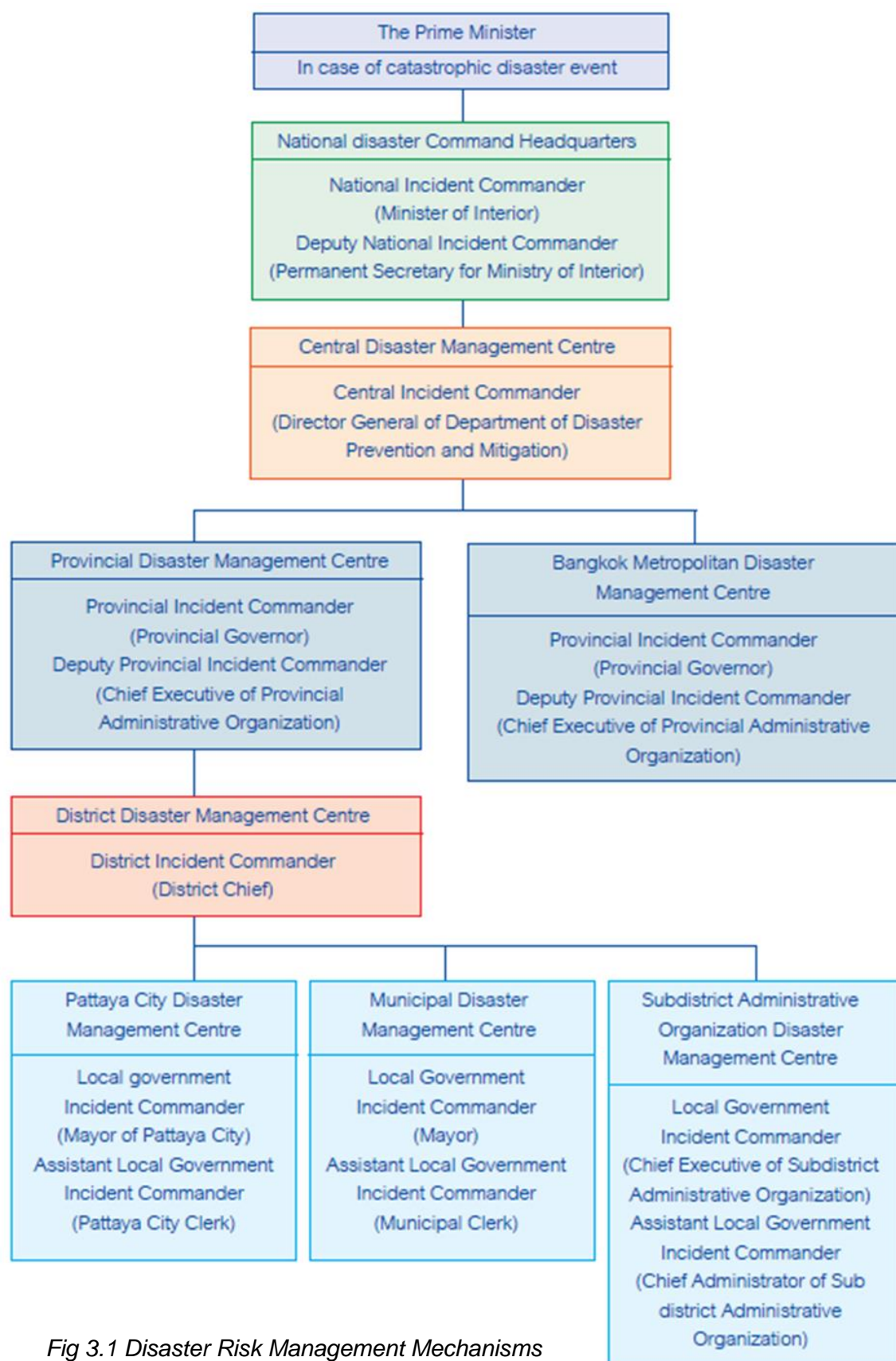


Fig 3.1 Disaster Risk Management Mechanisms

3.2 Emergency and Incident Management

An emergency and incident management in Thai context is classified into four levels based on a wide range of parameters, including areas affected, size, severity level and complexity, number of population, existing capacity for emergency management as well as the availability and capability of resources capability. These who have legal authority must take these parameters into account when making decision to assume the role of Incident Commander.

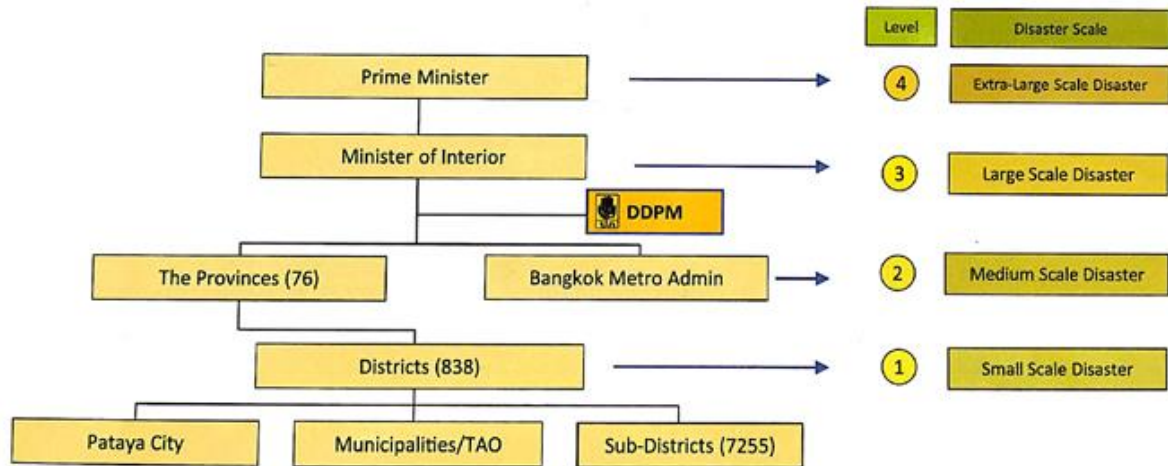


Fig 3.2 Organization Chart of Implementation Body

National Command Center Organization Chart

Fig.3.3 illustrates the formation of the National Disaster Prevention and Mitigation Command Center once it is activated. (DDPM, 2016)

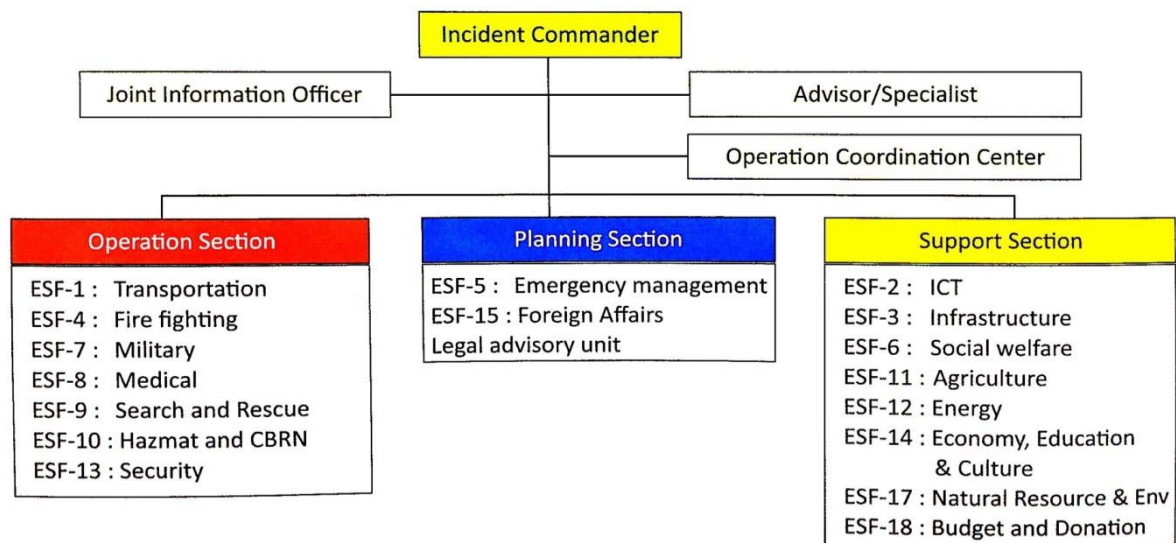
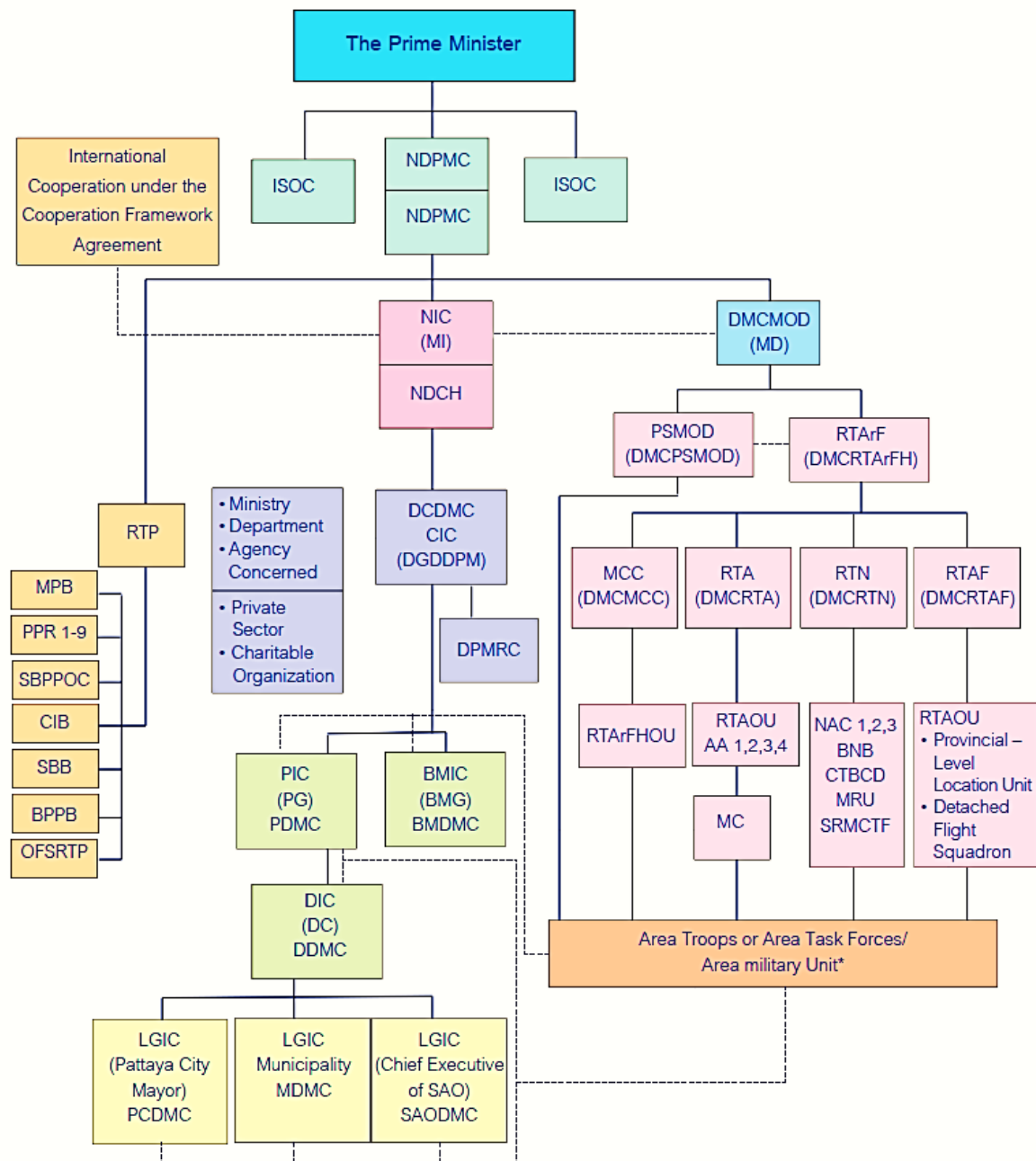


Fig. 3.3 The command Structure of the Nation Disaster Command Center when activated

Interagency Relationships and Collaborative Linkages for Emergency Management Operation



N.B.

- Chain of Command
- - - Chain of Communication

* Division of work and areas of responsibility need to be done in accordance with Disaster Mitigation Plan of Ministry of Defence and Memorandum of Understanding on

Disaster Management Operations between the Provincial Incident Commander and the Area Commandant

List of Acronyms

Ministry of Defence (MOD)

- **BNB** : Bangkok Naval Base
- **CTBCD** : Chanthaburi and Trad Border Defense Command
- **DMCMOD**: Disaster Mitigation Center, Ministry of Defence
- **DMCPSMOD**: Disaster Mitigation Center, Office of Permanent Secretary for Ministry of Defence
- **DMCRTA**: Disaster Mitigation Center, Royal Thai Army
- **DMCRTAF**: Disaster Mitigation Center, Royal Thai Air Force
- **DMCRTArFH**: Disaster Mitigation Center, Royal Thai Armed Forces Headquarters
- **DMCRTN**: Disaster Mitigation Center, Royal Thai Navy
- **MC**: Military Circle
- **MD**: Minister of Defence
- **MRU**: Mekhong Riverine Unit
- **NAC**: Naval Area Command
- **NMCCRTArFH**: National Military Command Center, Royal Thai Armed Forces Headquarters
- **OPSMOD**: Office of Permanent Secretary for Ministry of Defence
- **OU**: Organic Unit
- **RTA**: Royal Thai Army
- **RTAF**: Royal Thai Air Force
- **RTArF**: Royal Thai Armed Forces
- **RTArFH**: Royal Thai Armed Forces Headquarters
- **RTAFOU**: Royal Thai Air Force Organic Unit
- **RTANOU**: Royal Thai Navy Organic Unit
- **RTAOU**: Royal Thai Army Organic Unit
- **RTN**: Royal Thai Navy
- **SRMCTF**: Southern Region Marine Corps Task Force

Ministry of Interior (MOI)

- **BMG**: Bangkok Metropolitan Governor
- **MI**: Minister of Interior
- **PG**: Provincial Governor
- **DC**: District Chief

- **SAO:** Subdistrict Administrative Organization

Department of Disaster Prevention and Mitigation (DDPM)

- **DGDDPM:** Director General of Department of Disaster Prevention and Mitigation
- **DPMRC:** Disaster Prevention and Mitigation Regional Centre
- **NDRMP:** National Disaster Risk Management Plan

The Prime Minister's Office (PMO)

- **NSC:** Office of the National Security Council
- **RTP:** Royal Thai Police
- **MPB :** Metropolitan Police Bureau
- **SBPPOC :** Southern Border Police Operation Center
- **CIB :** Central Investigation Bureau
- **SBB :** Special Branch Bureau
- **BPPB :** Border Patrol Police Bureau
- **OFSRTP :** Office of Forensic Science, Royal Thai Police
- **PPR 1-9 :** Provincial Police Regional 1-9

Implementing Mechanisms

- **ISOC:** Internal Security Operations command
- **CDMC:** Central Disaster Management Centre
- **DCDMC:** Director of Central Disaster Management Centre
- **BMDMC:** Bangkok Metropolitan Disaster Management Centre
- **PDMC:** Provincial Disaster Management Centre
- **DDMC:** District Disaster Management Centre
- **MDMC:** Municipal Disaster Management Centre
- **PCDMC:** Pattaya City Disaster Management Centre
- **SAODMC:** Subdistrict Administrative Organization Disaster Management Centre
- **NDCH:** National Disaster Command Headquarters
- **ESF:** Emergency Support Functions
- **DCC:** District Command Center
- **PCC:** Provincial Command Center
- **BMCC:** Bangkok Metropolitan Command Center

National Committee

- **DPPMC:** National Disaster Prevention and Mitigation Committee
- **NSC:** National Safety Council

Commander

- **NIC:** National Incident Commander (Minister of Ministry of Interior)
- **CIC:** Central Incident Commander (Director General of Department of Disaster Prevention and Mitigation)
- **PIC:** Provincial Incident Commander
- **BMIC:** Bangkok Metropolitan Incident Commander
- **DIC:** District Incident Commander
- **LGIC:** Local Government Incident Commander

3.3 Department of Disaster Prevention and Mitigation

Department of Disaster Prevention and Mitigation (DDPM), according to the Bureaucrat Reform Act 2002, has been formed by different organizations responsible for disaster prevention and mitigation as follows:

- (1) Civil Defence Division of Department of Provincial Administration;
- (2) Department of Accelerated Rural Development;
- (3) Department of Social Welfare, Department of Community Development; and
- (4) Office of National Safety Council

According to Article 11 of Disaster Prevention and Mitigation Act B.E.2550, DDPM is mandated to be central government agency under the umbrella of Ministry of Interior to undertake the work on disaster prevention and mitigation at a national level. Aside its Head Office in Bangkok, DDPM has thoroughly 76 DDPM provincial offices, and 18 regional centers. The locations of DDPM regional centers namely;

- 1) Disaster Prevention and Mitigation Regional Center, Zone 1 Pathum Thani
- 2) Disaster Prevention and Mitigation Regional Center, Zone 2 Suphan Buri
- 3) Disaster Prevention and Mitigation Regional Center, Zone 3 Prachin Buri
- 4) Disaster Prevention and Mitigation Regional Center, Zone 4 Prachuap Kiri Khab
- 5) Disaster Prevention and Mitigation Regional Center, Zone 5 Nakhon Ratchasima
- 6) Disaster Prevention and Mitigation Regional Center, Zone 6 Khon Kean
- 7) Disaster Prevention and Mitigation Regional Center, Zone 7 Sakhon Nakhon
- 8) Disaster Prevention and Mitigation Regional Center, Zone 8 Kamphaeng Phet
- 9) Disaster Prevention and Mitigation Regional Center, Zone 9 Phitsanulok
- 10) Disaster Prevention and Mitigation Regional Center, Zone 10 Lampang
- 11) Disaster Prevention and Mitigation Regional Center, Zone 11 Surat Thani
- 12) Disaster Prevention and Mitigation Regional Center, Zone 12 Songkhla
- 13) Disaster Prevention and Mitigation Regional Center, Zone 13 Ubon Ratchathani
- 14) Disaster Prevention and Mitigation Regional Center, Zone 14 Udon Thani
- 15) Disaster Prevention and Mitigation Regional Center, Zone 15 Chaing Rai
- 16) Disaster Prevention and Mitigation Regional Center, Zone 16 Chainat

17) Disaster Prevention and Mitigation Regional Center, Zone 17 Chanthaburi

18) Disaster Prevention and Mitigation Regional Center, Zone 18 Phuket

In 2004, Disaster Prevention and Mitigation Academy (DPMA) has been established and 6 campus in Prachinburi, Songkhla, Chiang Mai, Khon Kaen, Phuket, Phitsanulok which is currently conducting training for its own staffs, some government stakeholders and private organization.

DDPM's responsibility:

1. Materializing disaster and civil emergency prevention and warning Systems and creating preparedness in all areas.
2. Directing and implementing disaster and civil emergency mitigation activity systematically, rapidly, equitably and thoroughly.
3. Procurement of materials, equipments, and vehicles, indispensable for disaster prevention, mitigation, suppression and for relief operation.
4. Rehabilitation of damaged public utilities, physical and mental recuperation of disaster victim, and restoration of livelihood. All these activities are carried out on thorough, equitable and rapid basis, and be in harmony with the needs of the victims.
5. Mainstreaming and collaborating disaster prevention and mitigation system, programme, the implementation evaluation with other national and international agencies.

Disaster Management in DDPM's main activities

Disaster Management comprises 3 phases as follow;

1. Preparedness Phase: DDPM has supported the provinces to carry out preparedness related activities as follow;

- (1) Formulating disaster prevention plan.
- (2) Training the officials and Civil Defence Volunteer.
- (3) Educating the general public.
- (4) Procuring equipments, vehicles and other amenities and safety temporary shelters.
- (5) Conducting annual drills and exercise in different levels.

2. Prevention and Mitigation Phase: In the event of disaster or the potential disaster, DDPM will implement the following activities.

1. Early warning: After receiving the information of potential disaster from Department of Meteorological and Department of Mineral Resources, DDPM will immediately relay to the risk province to further warn the people of the hazard or evacuate the people.
2. Directing Unit: The National Committee will set up "Operation Center" to manage disaster
3. Providing relief operation to the affected people thoroughly and rapidly.

4. Coordinating: In the event of large-scale disaster, DDPM will coordinate with all agencies concerned to mobilize relief efforts to affected areas.
5. Telecommunication: The Director of National Committee is authorized to utilize all telecommunication facilities in the affected areas. DDPM will coordinate with telecommunication concerned agencies to provide the substitute facilities in case the telecommunication system in the affected area broke down.
6. Public Relations: At national level, DDPM is responsible for disseminating the disaster related information to the public continuously to protect the life and property of the citizens. Moreover to alert the possibility of disaster just before a strong tremor is expected to strike as “a warning”

3. Recovery Phase: DDPM is responsible for

- (1) Providing relief to affected people: Provincial/District/Local authorities assess the damages and losses and enlist the affected persons. DDPM will carry out to pay cash compensation the victims.
- (2) Clean-up: DDPM will coordinate with all agencies concerned to mobilize the equipments to conduct clean-up activities.
- (3) Long-term Rehabilitation: DDPM is responsible for coordinating with all agencies concerned to collect all relevant information on long-term rehabilitation projects and further submit for cabinet’s approval

3.4 National Disaster Warning Center






The National Disaster Warning Center was established under the Order of the Office of the Prime Minister and then transferred to be under of the Ministry of Information and Communication Technology. It is to protect lives and properties of Thai people and foreign visitors by setting up the National Warning Center as soon as possible.

The major task of the National Disaster Warning Center is to detect earthquake and to analyze seismic data to determine the possibility of a Tsunami generation before issuing notification messages to the public and related authorities and rescuers for evacuation of people into safe places. This is to prevent the loss of people’s lives and properties as much as possible. From now on, the National Disaster Warning Center will be developed, upgraded of its early warning system and extended its telecommunication networks to be able to cope with multi-hazards disasters apart from Tsunami. Now, NDWC had transferred to be under of the Department of Disaster Prevention and Mitigation.

3.5 Early Warning Systems

From concept of action, early warning system is a structure of disaster management system and a communication system for timely dissemination of warning information to the authorities and general public. Guiding principles for effective early warning systems include:

3.5.1 Levels of Alerts and Early Warnings : alert and warning information

-  Red : associated with colors are denotes the situation where the likelihood of hazardous event is most imminent. It is recommended to remain or stay in completely safe place and follow the advice or instruction of the authorities.
-  Orange : denotes the situation where the likelihood of hazardous is imminent. The government officials are attempting to bring emergency situation under control. Take immediate action to evacuate to designated safety place and follow the guidelines set fort
-  Yellow : denotes the situation where there has been an increased likelihood of hazardous event. It is advised to be prepared to cope with potential disaster and to conform to the current advice.
-  Blue : denotes the situation where an activation of disaster surveillance system is needed. Take all required steps to closely keep track of disaster information on a 24 hour basis.
-  Green : denotes non – emergency situation. It is advised to keep track of relevant information on a regular basis.

3.5.2 Notification and Warning Dissemination Process : encompasses the following actions :

1) Keeping constant watch and monitoring:

These actions aim at monitoring and conducting surveillance the evolving situation of the ongoing incident that may result in a high potential for devastating disaster, including provision of timely and efficient information to general public. These actions are undertaken on an around – the - clock basis by relevant government agencies that are well – equipped with relevant knowledge and high – end equipment and technology, including Thai Meteorological Department, Royal Irrigation Department, Department of Mineral Resources, hydrographic Department, etc. In this connection, Ministry of Information and communications Technology has been assigned to play a critical role in systematizing

communication system, and all other relevant agencies should be prepared to adequately procure communication equipment needed to link up with overall communication system and to ensure their full - fledged, 24 – hour operational capability. And in the meantime to enable the National Disaster Command Headquarters and the Central Disaster Management Centre to carry out information exchange, analysis and situation assessment for the purpose of making well - informed decision in the wake of disaster.

2) Early warning notification:

This action aims at notifying and alerting government agencies, units, the Disaster Management Centres at all levels and the general public of significant likelihood of hazardous event in areas at risk in order to monitor and conduct surveillance of the evolving situation of the ongoing incident on a continuous basis. The time – frame for notification of early warning information varies in accordance with types of hazard. Generally, notification should be made no later than 120 hours in advance of actual event. As the Central Coordinating Centre, Ministry of Information and Communication Technology in conjunction with Public Relations Department are in charge of establishing guidelines, measures, and protocol in collaboration with relevant agencies whose missions are to conduct surveillance and monitoring of emergency situation, publicizing and dissemination of warning information in order to ensure an application of common protocols and standards for alert and notification. This will help facilitate the proper perception of warning information by, and better understanding of the target recipients

3) Emergency warning:

This action aims at validating data and information confirming that probability of disaster occurrence has increased by more than sixty percent, and at notifying government agencies, units, the Disaster Management Centres at all levels and the general public in the areas at risk of operating principles to ensure their state of readiness to deal with potential disasters. The issuance of emergency warnings and timely notification should be made not less than 72 hours in advance of actual event. The content of an emergency notification should include the following information, if known :

- Timeline of expected disaster and areas expected to be affected.
- Potential impacts and expected duration of a disaster.
- Operating principles for government agencies, units and general public.

- Preparation of basic survival needs to cope with the effects of disaster such as food, drinking water and medicines and other essentials.

In conjunction with other government agencies responsible for emergency notification, the Central Disaster Management Centre is required to put procedures and measures in place for issuing directives instructing the Disaster Management Centre at each level, Disaster Prevention and Mitigation Regional Centers, as well as assigning as well as assigning Public Relations Department along with Department of Provincial Administration to identify the procedures used to disseminate, distribute and publicize the information and to notify the executive heads of local bodies and the general public. These procedures are intended to ensure that the accurate emergency warning information has reached the target general public in a timely manner, and to ensure an application of common protocols and standards for alert and notification among relevant agencies.

It is crucial for the Disaster Management Centre at each level to report the results of its completion or execution of the required functions to the Central Disaster Management Centre within 24 hours upon receipt of warning to verify two – way communications and communications interoperability

4) Evacuation and emergency response preparedness

The Disaster Management Centre at each level is in charge of identifying and put in place the guide lines and procedures for government agencies, units and private sector organizations to follow in responding to emergency situation, as well as in developing emergency evacuation plan and conducting an evacuation drill. As a support agency, Disaster Prevention and Mitigation Regional Centre will provide resource support to entities involved in delivering response efforts. Nevertheless, when that the emergency situation escalates, the incident management and control is beyond the normal capacity or authority of on – site emergency response authorities, the agencies involved are required to notify the Central Management Centre of such situation instantly

4. Legal Framework and National Disaster risk Management Plan

4.1 Legal Framework

The Disaster Prevention and Mitigation Act B.E. 2550 (2007) has served as the principal legal mechanism for disaster risk management practices in Thailand, coupled with an application of other disaster risk management related laws/regulations/notifications/directives. These legal mechanisms have been elaborated as follow : (DDPM, 2011)

4.1.1 Major Law

Disaster Prevention and Mitigation Act B.E. 2550 (2007) and its six relevant supportive legislations namely ;

- 1) Ministerial Regulation Prescribing Criteria and Method for Permissible Compensation Payable to Person (s) Injured While Performing Disaster - Related Duties Assigned B.E. 2554 (2011)
- 2) Regulation of Ministry of Interior on Criteria for Appointment of Disaster Prevention and Mitigation Officials and Their Performance of Assigned Duties B.E. 2553 (2010)
- 3) Regulation of Ministry of Interior on Civil Volunteer Affairs B.E. 2553 (2010)
- 4) Regulation of Ministry of Interior on Disaster Prevention and Mitigation Official Uniforms, Insignia, and Identification Card B.E. 2554 (2011)
- 5) Regulation of Ministry of Interior on Criteria for Issuance of Reference and Verification Letter to Disaster Affected People or Owner or Possessor of Property for Establishing Entitlement to Disaster Relief Assistance or Other Services B.E. 2552 (2009)
- 6) Notification of Department of Disaster Prevention and Mitigation on Disaster Affected People Verification Form

4.1.2 Other Relevant Law/Regulation/Notification/Directive

1) Public Administration Act B.E. 2534 (1991) and Relevant Regulations of Office of the Prime Minister namely;

- (1.1) Regulation of Office of the Prime Minister on National Water Resources Management B.E. 2550 (2007)
- (1.2) Regulation of Office of the Prime Minister on Prevention and Elimination of Maritime Oil Pollution B.E. 2547 (2004)
- (1.3) Regulation of Office of the Prime Minister on National Disaster Warning System Management B.E. 2552 (2009)
- (1.4) Regulation of Office of the Prime Minister on Donations and Provision of Assistance to Disaster Victims B.E. 2542 (1999)

- (1.5) Regulation of Office of the Prime Minister on Mutual Fund for Mitigation of Disaster Loss and Damage in Agricultural Sector B.E. 2539 (1986)
 - (1.6) Regulation of Office of the Prime Minister on Mutual Fund for Mitigation of Disaster Loss and Damage in Agricultural Sector (2nd Edition) B.E. 2548 (2005)
 - (1.7) Regulation of Office of the Prime Minister on Public Utilities Operations Coordination B.E. 2529 (1986)
 - (1.8) Regulation of Office of the Prime Minister on National Safety B.E. 2538 (1995)
 - (1.9) Regulation of Office of the Prime Minister Regarding National Policy on the Rehabilitation of the Sea B.E. 2539 (1996)
 - (1.10) Regulation of Office of the Prime Minister on Practices of Collecting Donations of State Agencies B.E. 2544 (2011)
 - (1.11) Regulation of Office of the Prime Minister Regarding National Executive Committee on Agricultural Credit B.E. 2541 (1998)
- 2) Budgeting Process Act B.E. 2502 (1979) and the relevant regulations issued by Ministry of Finance Namely;
- (2.1) Regulation of Ministry of Finance on Contingency Fund Advances for Assisting Disaster Affected People B.E. 2556 (2003)
 - (2.2) Criteria for the Use of Contingency Fund Advances for Assisting Thai Citizens Overseas B.E. 2541 (1998)
 - (2.3) Regulation of Ministry of Finance on Contingency Fund Advances for Emergency Expenditures or maintaining National Security B.E. 2532 (1989)
 - (2.4) Regulation of Ministry of Finance on Contingency Fund Advances for Prevention and Elimination of Maritime oil Pollution B.E. 2547 (2004)
 - (2.5) Regulation of Ministry of Finance on Contingency Fund Advances for Assisting People Experiencing Rainfall Shortage B.E. 2521 (1978)

4.2 National Disaster risk Management Plan (2015)

4.2.1 Background

Disaster Prevention and Mitigation Act 2007 is the main legal basis providing framework for all sectors in disaster risk management. According to Article 44 of Disaster Prevention and Mitigation Act 2007, when foreseeable that the country risks situation is changing or the existing National Disaster Prevention and Mitigation Plan has been implemented for five years, it is recommended to revisit and revise the plan in a timely manner. Article 11 (1) of the said Act, therefore, mandated The Department of Disaster Prevention and Mitigation (DDPM) to be responsible agency for such plan development. Before the plan can be in effective, DDPM has to propose it to the National Disaster Prevention and Mitigation Committee (NDPMC), chaired by Prime Minister or designated Deputy Prime Minister for approval and later to the Cabinet for endorsement. This current national plan has undergone

a participatory planning process, where related sectors were engaged, including public, private and civil society. The Plan was approved by NDPMC on 9 February 2015. Then on 31 March 2015, the Cabinet endorsed the Plan and enforced related sectors of all levels to implement the plan, to develop their own action plan and to incorporate projects and programs on disaster risk management into their annual plan. The Cabinet also urged the Budget Bureau, concerned agencies and local governments to allocate sufficient budget to projects/programs on disaster risk reduction, emergencies response and recovery in a sustained manner.

4.2.2 Disaster Risk Management Target

- 1) To ensure overall readiness of the national disaster risk management system to deal with potential disaster incidents through integrated and coordinated collaboration with stakeholders across multiple sectors and countries to timely provide disaster relief and emergency assistance to disaster affected people as well as undertaking the immediate and long – term disaster recovery and reconstruction in the affected areas in a fair and thorough manner with a view to establishing standards and practices for national disaster risk management.
- 2) To cultivate a lifelong learning culture amongst, and boost the natural disaster immunity of all sectors of society in Thailand aiming to gain a better grasp of the ways to manage disaster risk through providing spaces and opportunities for individuals, communities, civil society and other stakeholders to participate in disaster risk management practices towards sustainable development.
- 3) To increase public safety awareness through highlighting the creation of body of knowledge, awareness, and safety culture as well as developing local and community capacity gearing towards building community resilience to disasters.

4.2.3 Objectives of National Plan

- 1) To provide consistent nationwide concept of operations to enable national and local governments, private sector, and other sectors of society to collectively implement disaster management activities in an integrated and systematic manner, and in the same direction.
- 2) To compile the current internationally – recognized guidelines and directions and are used worldwide for disaster risk management that can be applied to disaster risk management in Thai context and to be used in the development of relevant plans at different levels of government such as Provincial Disaster Risk Management Plan, Bangkok Metropolitan Administration Disaster Risk

Management Plan, including Disaster Management Action Plan of the local administration organizations and Emergency Support Function Plans etc., to enable these local authorities to more efficiently and effectively deal with disasters.

- 3) To develop and enhance capacities for disaster risk management which encompasses disaster risk reduction, emergency management and building back better and safer at community, local, national and international levels to further minimize the potential losses from disasters.

This National Disaster Risk Management Plan (2015) has been developed based on the national disaster management policy and the national disaster risk management strategy as follow

4.2.4 National Disaster Management Policy

The National Disaster Prevention and Mitigation Committee has laid down the following four national disaster management policy framework's focus areas.

- 1) Improving and promoting disaster risk reduction by means of boosting the efficiency of disaster prevention, preparedness, and reducing disaster impacts through creating safe communities and promoting community and local involvement in improving disaster management practices in order to build resilience, foster adaptation to the effects of disaster events towards sustainable development.
- 2) Synergizing multisectoral partnerships' efforts to develop and enhance the capacities necessary for more effective, efficient and coherent emergency management as well as for equitable, timely and impartial distribution of relief supplies to disaster victims and mitigating disaster impacts.
- 3) Developing disaster recovery system that ably handles the demand for recovery assistance of disaster victims in a timely and impartial manner and the needs for rapid rehabilitation and reconstruction of disaster devastated areas to previous state or building back better and safer.
- 4) Developing and promoting the standards on international cooperation for disaster risk reduction between and among partnerships and networks at both national and international levels to be more efficient and effective.

4.2.5 Disaster Risk Management Strategy

The strategies for disaster risk management outlined in this National Plan are intended to enhancing the national efficiency and effectiveness in fulfilling national disaster risk management targets and the objectives set forth, in order to meet international standards ; to ensure public safety and protection of life and of public and private property ; as well as

boosting and maintaining social and economic sustainable stability. The followings are four key strategies for disaster risk management.

Strategy 1 Focusing on disaster risk reduction

Strategy 2 Applying integrated emergency management system

Strategy 3 Strengthening and enhancing the efficiency of sustainable disaster recovery

Strategy 4 Promoting and strengthening international cooperation on disaster risk management

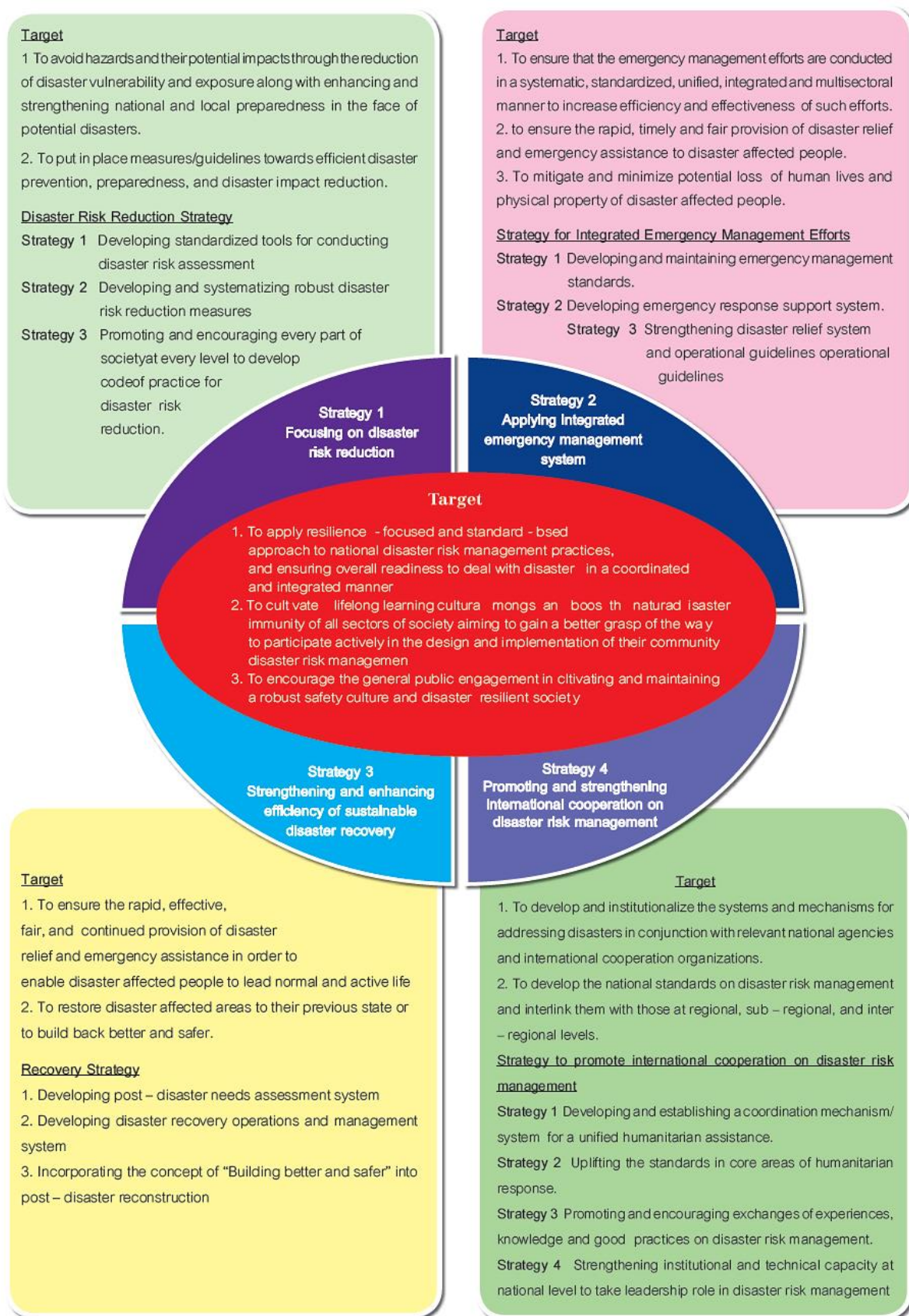


Fig.4.1 Disaster Risk Management Strategy.

5. International Cooperation

Since its establishment in 2002, DDPM has been working closely with international partner organizations and countries in all areas of disaster management including disaster monitoring, early warning, prevention and mitigation and mitigation, preparedness and response, disaster relief and recovery. (DDPM, 2016)

5.1 Partnerships with International bodies/agencies

1. The ASEAN Committee on Disaster Management (ACDM) and ACDM Working Groups.
2. Asian Disaster Reduction Center (ADRC)
3. Asian Disaster Preparedness Centre (ADPC)
4. The Typhoon Committee (TC)'s Working Group on Disaster Risk Reduction
5. APEC's Emergency Preparedness Working Group (EPWG)
6. ASEAN Regional Forum (ARF)
7. Japan International Cooperation Agency (JICA), Japan
8. USAID & USFS
9. GIZ

5.2 International Frameworks and Guidelines

1. The ASEAN Agreement on Disaster Management and Emergency Response (AADMER) and the AADMER Work Programme 2016 - 2020
2. The ASEAN Declaration on One ASEAN One Response (OAOR)
3. The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015 – 2030
4. Bangkok Declaration on Disaster Risk Reduction (The outcome of the 6th AMCDRR)
5. UNDAC/INSARAG Guidelines (UN-OCHA)
6. APC MADRO (UN-OCHA)
7. ASEAN SASOP and ERAT Guidelines (AHA Centre)
8. East Asia Summit (EAS) Disaster Management Tool Kits
9. IFRC's Guideline for International Disaster Relief Laws

6. Recent Projects on Disaster Risk Reduction

6.1 Flood Prevention Project

Since 2014 to the present DDPM has been Flood Prevention Project is the reconstruction of the existing water resources to prevent and tackle drought and floods include Prevent and reduce the impact of flooding, flash flood and mudslide structures more than 2232 project over budget 6.8 Billion Bath.

6.2 One-Tambon-One-Search and Rescue Team (OTOS)

DDPM has realized the urgent need to setup efficient and skillful search and rescue team at provincial, district and local levels. In this regard, DDPM has launched OTOS program which contains ; at the provincial level, the training of provincial SAR teams were completed and have been assigned to be SAR instructors ; at district level, district SAR team have been trained to become instructors as well ; at Tambon level (Thailand's administrative unit in between district and village). Nowadays, OTOS program is completed with 7,255 SAR teams (10 members) based in each tambon or local administration offices 6,119 local authorities throughout the country and more than 73,831 volunteers trained.

6.3 Disaster Management Training for managers, practitioners, local government officers and others through DDPM's Disaster Prevention and Mitigation Academy (DPMA)

Department of Disaster Prevention and Mitigation has set up Disaster Prevention and Mitigation Academy (DPMA) in October 2004 to be the national training center in the field of disaster management. DPMA has coordinated with the agencies and developed countries including international organizations to develop curricula and mobilize the technology and knowhow for standardize training. The courses will be organized to serve the capacity of the government officers, local administration officers and private sector who are in charge of the disaster management including civil defence volunteers. Nowadays, DPMA has extended to 6 campuses in upcountry. The standard curricula have consisted of the Fire Fighting, Building Collapse (Search and Rescue), Hazmat Emergency Management, Civil Defense Volunteer and Disaster Management.

6.4 Community-Based Disaster Risk Management (CBDRM) Program

DDPM has adopted and applied this appropriate people participatory approach to generate the awareness among the general public and mobilize their participation in every phase of disaster management so as to build safer and resilient community. In the past year, DDPM collaborates with various government agencies, local authorities, NGOs and international organization. This program will be jointly organized on the continuous to cover all vulnerable

communities nation-wide. Nowadays, CBDRM program is completed with 8,000 vulnerable communities from 26,000 vulnerable communities.

6.5 “Mr. Warning” Training Program

In conjunction with various government agencies and NGO, DDPM has implemented a community-based volunteer training program which aims at creating a disaster warning network in the flashflood and mud slide prone villages. The trained villagers are designated as “Mr. Warning” and assigned to be the “vigilant”, “forewarner” and “coordinator” in emergency and non-emergency situation respectively. This program has been in concerted with its preceded program, “Simple Rain Gauge Installation” program. Nowadays, “Mr. Warning” training Program is completed with 8,221 trained people in the flood prone areas to be trained in this programme.

6.6 Emergency Response Team Development Project (ERT)

Emergency Response Team or ERT has been developing by DDPM to response for each type of large-scale hazards or incidents. Basically, ERT was set up 20 teams, 2 teams embedded in DDPM, Bangkok Office, and the other 18 teams in each Regional Center of DDPM. Each ERT will consist 10 members, including one (1) team leader, three (3) for planning, and six (6) for operation. Team leader will be the chief officer to coordinate with Provincial Director and officers of the Ad-Hoc Directing Center in case of disaster occurring.

6.7 Development of Civil Defence Volunteer Network Program

The main objective of this program is to increase the number of community-based Civil Defence Volunteer whose function is to holistically assist the government official's operation of all disaster. Currently, there are approximately 1 million Civil Defence Volunteers that had been trained and registered nation-wide. These Civil Defence Volunteers are based in their community and are on stand-by to be summoned all time. Nowadays, Civil Defence Volunteer Network Program is completed with 1,106,465 trained people.

7. Counterpart of ADRC

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