

## Disaster Loss and Damage Assessment in Thailand

*SuppakornChinvanno, JariyaThitiwate, RungkarnRujjwarangkul*

*Southeast Asia START Regional Center*

### 1. Disasters in Thailand

Over the past several years, many countries, including Thailand, have encountered a number of natural disasters. These disasters not only occur more frequently but also cause greater damages than their predecessors. Extreme events such as earthquakes, floods, and storms lead to major social, environmental, human, and economic losses. Despite an ongoing effort to monitor environmental changes, many countries are still facing problems in disaster early warnings and mitigation during and after the events, leading to substantial loss of life and property.

The increased frequency and magnitude of natural disasters expected in the future are due, in part, to climate change caused by global warming. As a result, the Earth is expected to see more intense ocean activities, severe storms, floods and droughts across all regions (IPCC, 2014). Population growth and urbanization in recent years has led people to settle in disaster-prone areas, inevitably putting the economy and their livelihoods under greater threats from the increasingly severe natural hazards—further complicating prevention efforts.

The statistics of natural disaster occurrences in Thailand between 1997-2007, according to the Thai Meteorological Department (TMD) and the Department of Disaster Prevention and Mitigation (DDPM), are categorized as follows:

Type of Disaster	Period	Disaster Area
Cold Spell	October - January	Central, North, Northeast and East
Drought	January - May	Almost all regions of Thailand
Flood	June - September October – November	Almost all regions of Thailand
Landslide	June - September October – November	Almost all regions of Thailand
Summer Monsoon	March - May	Almost all regions of Thailand
Earthquake	Year-round monitoring	North and West
Storm Surge	October - November	South

Source: Thai Meteorological Department and Department of Disaster Prevention and Mitigation

Thailand has faced many disasters including geophysical, hydrological, and extreme weather events, which have caused extensive loss of life and assets in recent years. Some of the major events are:

Floods have been, arguably, the most destructive disaster in Thailand. Statistics show that from 2002-2011 Thailand averaged nine floods per year; the decade's maximum of 17 events took place in 2003. The event in 2001, which affected over 13 million households in 65 of

the 77 provinces (including Bangkok, the capital of Thailand), incurred the most damage, costing 46.6 billion USD and 813 deaths (Thailand's Ministry of Finance, World Bank, 2012).

Droughts, which occur every year in Thailand, have widespread impacts on rural, especially agricultural, areas and are likely to worsen. The dry spell in 2005 damaged 21,979 sq.km. of farmland with an estimated loss of 229 million USD in total (DDPM, 2011). Worse yet, the 2009 drought in Thailand affected over 17 million people in 47,048 villages all over the country, setting a new record-high.

Landslides usually occur during or soon after flashfloods or heavy rainstorms. Statistics show that the landslides in Phrae province in 2011 affected 7,870 people from 1,651 households, leaving 36 dead, 58 injured, and 4 missing. The 2006 landslides, which occurred in the five provinces of the lower North (Uttaradit, Sukhothai, Phrae, Lampang, and Nan), resulted in 87 deaths (Uttaradit 75, Sukhothai 7, and Phrae 5) and 29 missing persons (Uttaradit 28, Sukhothai 1). Additionally, 687 houses were reported to be completely destroyed while 2,970 others were partially damaged. The event affected 352,016 people from 108,762 households; 10,601 of these people were forced to evacuate (Department of Mineral Resources, 2012). In addition to severe weather, another major contributing factor in causing landslides is human activities such as deforestation.

From 2002-2010, the Thai government received an average of over 2,000 storm-induced damage reports annually with a total death of 286 and a total loss of 64 million USD over the period. The highest number of incidents was reported in 2004 with a total of 3,834 and the trend is expected to continue rising (DDPM, 2011).

Despite Thailand never encountering any major earthquakes, a recent survey reveals that one of the active fault lines, the Srisawat fault line, is still causing five to six noticeable quakes across the west and the north of Thailand every year. The latest seismic activity along the Phayao fault line in the northern province of Chiang Rai, with the magnitude of 6.3 and seven kilometers underground, caused catastrophic damage across the region. It was the biggest quake ever measured in Thailand (Thai Meteorological Department).

In 2004, Thailand faced a devastating tsunami which hit each of the six southwestern provinces along the coast of the Andaman Sea. The aftermath was at least 5,395 people killed, 8,457 injured, and 2,187 missing. The disaster presented the local tourism industry with an immediate loss of approximately 890 million USD (Research and Development Division, Research and International Cooperation Bureau, DDPM, 2009).

Thailand has been constantly affected by disasters in every region and has experienced great economic, human and property losses as a result. In the past 10 years, the degree of severity and the frequency of these disasters has risen, and in turn caused more damage to the economy. Flooding, the most frequently occurring disaster in Thailand, has the greatest

impact on the country. According to the Ministry of Finance’s statistics (Table 1) from 2004 – 2008, the amount of financial relief that the Thai government budgeted to compensate disaster victims has increased unceasingly. In 2008, the figure topped 274 million USD; 57% percent of which goes to flood victims, followed by drought (26%), and cold spell (5%) (Table 2).

**Table 1 Statistics showing Thai government’s financial aid arrangements for disaster victims according to the Ministry of Finance’s order on the government’s advances for disaster victims in emergency situations, 2003 and its amendments**

Fiscal Year	Amount (million USD)
2004	48
2005	150
2006	192
2007	235
2008	274
Average	178.9

Source: Disaster Victim Assistance Bureau, Department Of Disaster Prevention and Mitigation, 2011

**Table 2 Government advance disaster payouts by types of disaster from 2004-2008**

Rank	Disaster	Proportion to Total Payout (%)	Amount (million USD)
1	Flood	56.92	101.83
2	Drought	25.55	45.71
3	Cold Spell	4.77	8.53
4	Tsunami	3.24	5.80
5	Storm	3.19	5.71
6	Avian Influenza	1.94	3.47
7	Dry Spell	1.82	3.26
8	Fire	1.22	2.18
9	Pest Outbreak	0.59	1.06
10	Terrorism	0.27	0.48
11	Others	0.26	0.88

Source: Disaster Victim Assistance Bureau, Department Of Disaster Prevention and Mitigation, 2011

## 2. Thailand’s Disaster Loss and Damage Assessment

In the case of a disaster occurrence, there are two types of impact assessments that would help determine the severity of the disaster. These assessments provide necessary information for policy planners to properly prepare coping mechanisms, disaster recovery plans, and disaster preparedness plans. Disaster loss and damage assessment is the calculation that aims to analyze the impact of the disaster in terms of damage valuation and economic loss. Damage and needs assessment estimates the damage to disaster victims and needs from external sources to cope with the situation under the occurrence of disaster (Department of Disaster Prevention and Mitigation. 2015). These assessments are the main mission of the Department of Disaster Prevention and Mitigation (DDPM), Ministry of

Interior, whose key responsibility is to integrate and coordinate with other agencies to gather information on disaster damage, needs and loss during and after the event. Another key agency that also conducts disaster damage assessment is the Ministry of Agriculture and Cooperatives. However, according to the government's policy regarding support of the agricultural sector, the Ministry of Agriculture's role is to focus solely on assessing farm crop damage. Most assessments conducted in Thailand focus on damage and needs assessment, which is intended for managing financial aid allocations from various sources rather than damage and loss. Alternatively, a damage and loss assessment is usually carried out in times of major disasters by international organizations, such as the World Bank, etc. Another type of assessment, which is usually executed concurrently, includes damage assessment under crop insurance schemes and area-based inundation risk assessments for the insurance industry.

The following are the types of disaster assessments usually conducted in Thailand:

### 2.1 Damage and Needs Assessment

According to standard protocol, the DDPM is the main organization responsible for collecting information about any damages incurred by a disaster when they are human or public and private property losses. The Ministry of Agriculture and Cooperatives is in charge of surveying losses in the agricultural sector (crops, livestock, and fishery). This method allows the government to allocate suitable aid/compensation/support to disaster-stricken communities.

The first procedure when a disaster occurs is for local government units, such as sub-districts/municipalities/districts, and other relevant agencies to gather information in the disaster-stricken area. Second, these parties will pass it through the ad-hoc disaster prevention and mitigation coordination centers to the DDPM for consolidation. Next, DDPM will report directly to the government and request an emergency grant approval. After the event resolves, the damage will be reassessed in financial terms following the same steps.

Every disaster damage assessment conducted up to this point has focused on the value of assets, such as buildings, houses, agricultural land and crops, based on the market prices. Aid money allocated to the disaster victims comes from several sources:

- 1) provincial and/or other local government budgets;
- 2) The annual government budget, which allocates funds to relevant line agencies;
- 3) special funds (i.e. advance money as stated in the Ministry of Finance's order on the government's advances fund for disaster victims in emergency situations, 2003 and its amendments);
- 4) central budget; and
- 5) donations.

## 2.2 Damage and Loss Assessment

A thorough review of government documents reveals that there is no agency which holds direct responsibility in conducting disaster damage and loss assessments in Thailand. In the past, assessments were only carried out for major disasters which affected the economy on a macro or national scale. Even these were only conducted by international organizations like the Asian Disaster Preparedness Center (ADPC), who undertook the assessment for the 2004 tsunami, or the World Bank's assessment of the great flood in 2010-2011 in Thailand.

The South Asian tsunami which struck Thailand in 2004 was caused by a 9.0 magnitude earthquake that originated in the Indian Ocean off the west coast of Sumatra Island in Indonesia. The waves radiated throughout the Indian Ocean, reaching the southeastern coastlines of India and Sri Lanka and continuing on to the eastern shore of Africa and the Andaman coast of Thailand. Six provinces in Thailand, which included Phuket, Krabi, Phang Nga, Ranong, Trang and Satun, were ravaged and left with countless casualties and properties losses. The ADPC's 'Economic Impact of the Tsunami in Thailand' report reveals that the event has cost the nation 588 million USD worth of damage and 1.96 billion USD of loss--or 2.54 billion USD in total. That amount accounted for 50% of the combined gross provincial product (GPP) (Asian Disaster Preparedness Center, 2006).

In 2011, Thailand was faced with the worst flood in more than 50 years. This was due to the impact of the tropical storms, Nok-ten, Haima, Haitang, and Nasat, combined with the heavy rainfalls in the northern and the northeastern regions of Thailand. Sixty-five out of 77 provinces, including Bangkok, were declared emergency disaster zones after being hit by extensive flash floods and overbank flows, which persisted for over six months. The World Bank has estimated the total damage and economic losses at around 46.6 billion USD. The assessment covered multiple sectors, including infrastructure (e.g. water resource management, transport, telecommunication, electricity, water supply, and sanitation), production (e.g. agriculture, livestock and fishery, manufacturing, tourism, finance and banking), social (e.g. health, social, education, housing, and cultural heritage), and cross cutting matters (e.g. environment). The industrial sector suffered the highest loss of 29.4 billion USD (Ministry of Finance, The World Bank, 2012).

## 2.3 Damage Assessment for Crop Insurance

Insurance is one of the mechanisms which can be used to manage disaster damage. Insurance mechanisms were originally adopted solely by the business sector, but are now evolving their way into government-private sector cooperation. This collaboration has resulted in various crop insurance schemes being piloted over the past few years. Lack of a proper damage assessment framework and a desire to avoid costly damage estimation and validation operations led to the trial of weather index-based crop insurance. This index-based system aims to help farmers hedge the risks that come from bad weather conditions.

Furthermore, it intends to minimize the complications of individual farm plot assessments by using a weather index as the condition to validate whether the insured plot is qualified for the claim, or not. For example, the insurance company will compensate the insured party according to the accumulated rainfall measured at a pre-designated rain station. Every farmer within the vicinity of the station is assumed to encounter the same loss regardless of the actuality. The Bank for Agriculture and Agricultural Co-operatives (BAAC) has been applying this scheme to two types of crops: in-season rice and maize. However, this particular mechanism is not popular among farmers because it does not reflect the actual damage and they lack an understanding of the risk hedging concept. Many have tried to experiment with other assessment mechanisms, hoping to better represent the actual damage, but most of these are still in the piloting phase (JICA Project – Rice farming insurance).

Thailand's Geo-Informatics and Space Technology Development Agency (Public Organization) or GISTDA, in collaboration with the General Insurance Association, has developed a pilot system to help assess risks in flood-prone areas. It is intended to be used by members of the General Insurance Association as a standard tool to establish a geo-informatics insurance policy database and a geographic information system for flood risk analysis and evaluation. The system will provide a comprehensive online map illustrating areas which have experienced repetitive floods in the seven year period from 2006 – 2012 for assistance with flood insurance planning.

### 3. Disaster Loss and Damage Assessment Framework

The DDPM has classified the magnitude of disaster into four levels, each assigned with responsible units, as follows:

Level	Magnitude	Unit in Charge
1	Small-scale/General disasters	Head of local administration/District and/or Deputy Governor of Bangkok
2	Medium-scale disasters	Provincial Governor and/or Bangkok Governor
3	Large-scale disasters which widely affect general public or disasters which require specialists or special tools and equipment	Head and/or Commander of National Disaster Prevention and Mitigation Committee
4	Large-scale disasters with severe impacts	Prime Minister or appointed Deputy Prime Minister

Source: National Disaster Prevention and Mitigation Plan 2010-2014 (Department Of Disaster Prevention and Mitigation, 2009)

Disaster loss and damage assessment for each level of severity are usually done according to a different framework.

1. In the case of general disaster events that happen yearly (level 1-2), the DDPM, under the Ministry of Interior, and the Ministry of Agriculture and Cooperatives will follow the standard damage and needs assessment protocol, collecting information for later consolidation and provision of recovery assistance. Information on the incurred damage is gathered by local administrations (sub-district/municipality/district) from site visits and from civilian reports. This data includes physical damage, such as number of people affected, number of deaths, and number of injured, as well as property damage, such as houses, buildings, hotels/apartments, factories, shrimp/fish farms, livestock farms, agricultural land, roads, bridges, mines/dykes/dams, temples/schools/government buildings, and waterways. The local officers will cross check the information before passing it on to the district to be reviewed, estimated for loss value, and reported to Local Disaster Aid Committee (LDAC), Provincial Disaster Aid Committee, the DDPM, and the cabinet, respectively.

As for damage in the agricultural sector, such as crops, livestock and fisheries, local agriculture officers from the Ministry of Agriculture and Cooperatives at sub-district and district levels will be in charge of coordinating and examining the damage and providing assistance to the affected farmers. The standard protocol involves site visits and taking reports from relevant local organizations and registered farmers. The victims will file a damage report, which will then be verified by the leader of the village/sub-district. After this, the report will be passed on to the District Agriculture Officer to be rechecked, verified, and estimated into figures for further assistance provision. The information will then be relayed to the Provincial Agriculture Office which will process the aid arrangements according to the Ministry of Finance's protocol and report to the DDPM to be consolidated into the national loss and damage report.

2. For large-scale disasters, the DDPM has established the National Disaster Prevention and Mitigation Plan B.E. 2558<sup>1</sup>, which brings the risk-management framework and model into practice. The plan primarily focuses on:

- 1) disaster risk reduction;
- 2) integrated emergency response administration;
- 3) disaster recovery enhancement; and
- 4) the promotion of international cooperation in disaster risk management.

One of the strategies used to enhance disaster recovery is developing the post-disaster needs assessments (PDNA), which consist of a Damage and Loss Assessment (DALA) and a Human Recovery Needs Assessment (HRNA). Both are intended to assess the physical (assets and public utilities) and economic losses from large-scale catastrophes, as well as social

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<sup>1</sup> 2015 AD

need in communal and industrial sectors. To facilitate decision making at the policy level, the extent of damage and need, available resources and key strategies must all be taken into account when planning disaster recovery. The Office of the National Economic and Social Development Board (NESDB) is in charge of the operation with the support of the Ministry of Interior, the Ministry of Finance, and the Bureau of the Budget. However, the plan has only just been released and, as of now, there is no concrete execution planned.

In the past, damage and need assessments were executed according to the integrated emergency management of the National Disaster Prevention and Mitigation Plan 2010-2014 (by the DDPM), which specifies the standard protocol as follows:

“In the case of disaster, the local ad-hoc operation center at each level (designated by the National Disaster Prevention and Mitigation Committee) will run a preliminary damage and needs assessment periodically to gather lists of victims’ names and damaged properties and issue official validation document to the victims for later recovery payment claim. The assessment results will be reported to the ad-hoc disaster prevention and mitigation coordination center. The assessment is done according to these steps:

- (1) Conduct a preliminary damage assessment on every aspect – human (number of fatalities, injured, and missing persons), household, agriculture, fishery, livestock, infrastructure, public utilities, etc. –in order to grant immediate assistance.
- (2) Conduct a preliminary needs assessment on survivors’ emergency needs for food, water, medicine, necessary items, shelter, etc.”

The assessment process consists of 2 stages:

- (1) A rapid assessment is conducted immediately, usually within the first week, after the occurrence of the event. The purpose of this tentative evaluation is to prioritize post-disaster emergency responses in order to provide necessary resources according to people’s immediate needs to sustain lives.
- (2) A detailed assessment is conducted right after the end of the emergency, or at least within two weeks post-disaster, depending on the accessibility to the disaster areas. Information gained from the assessment usually includes value of physical damage, social structure, estimates of budget and materials needed for relief; all of which will be used for long-term recovery planning. It requires involvement of specialists from different areas of expertise to conduct the loss and damage assessment.



The units or individuals responsible for the assessment must report on the situation, mitigation operation, assistance provision, and other relevant information according to the following steps:

- (1) A community leader surveys the immediate damage and need and reports to the local ad-hoc operation center;
- (2) The local ad-hoc operation center reports to the ad-hoc disaster prevention and mitigation coordination center in the next level; and
- (3) The ad-hoc disaster prevention and mitigation coordination center reports to the National Disaster Prevention and Mitigation Committee in the next level.

The final report must consist of: (1) type of disaster (2) date and time of occurrence (3) disaster situation (4) disaster area and (5) loss and damage report/assistance arrangements.

The assessment protocol for small and medium disasters has a bottom-up reporting process, which starts from local administrations (municipality/sub-district) collecting information from a site survey before reporting to the higher unit (district/province). The DDPM will gather the incoming information and report to the public and to the government to obtain approval for emergency and recovery funds. The DDPM and the Ministry of Agriculture and Cooperatives report the damage value in different terms. The DDPM usually assesses and reports losses in terms of monetary value of physical damage and the amount of the government's advance spent to aid the victims. The Ministry of Agriculture and Cooperatives will report only the amount of compensations paid out rather than the actual value of loss on agricultural products.

For more details on the existing disaster damage assessment process in Thailand, please refer to the Appendix 1.

#### **4. Conclusion**

Relevant agencies need to be aware that disasters are increasing in frequency and intensity and will lead to significantly increased government spending on disaster relief compensation. The trend will likely continue under the influence of global warming effects, which will result in climate change in the future. Immediate response and access to appropriate funds to cope with disasters will become of higher concern. Lack of proper framework and process to properly conduct disaster loss and damage assessment will result in disaster responses that are untimely and inaccessible. Decision makers will not have enough information to evaluate the situations and will thereby be unable to allocate appropriate funds for the victims. Lack of information, standard assessment tools and processes, on many occasions, has led to mismanagement that leaves victims

unaided. The resulting gap inhibits the government from establishing effective disaster prevention and recovery policies and plans.

The existing assessment process in Thailand, which only covers the damage and needs assessment, and requires local authorities to collect information in crisis areas and pass it on to higher ranking units to be validated, is ineffective and unstandardized compared to the widely accepted Damage and Loss Assessment (DALA) framework (GFDRR, 2010) used by the World Bank in the Great Floods in 2011. That standardized assessment methodology has provided comprehensive details on the situation and more accurate estimation of loss and damage in every aspect, which contributes greatly to the aid approval process as well as the post-disaster strategy and recovery planning. However, such assessment requires financial and human resources, as well as engagement of experts in various fields, which is a limitation Thai agencies have yet to overcome. The Thai government is aware of the importance of such disaster damage and loss assessment methodology and has in principle commissioned the NESDB and the DDPM to take responsibility in developing a standardized disaster assessment procedure. Unfortunately, at present the idea has not yet been driven forward.

Information on disaster loss and damage, whether it is physical, human, or other aspects of losses, is considered crucial for ensuring inclusive and fair post-disaster relief delivery. Besides the DDPM, other organizations, such as the Thai General Insurance Association (TGIA) are also trying to develop a standardized loss and damage assessment system to help speed up the process and minimize the costs and complications of on-field operations.

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