MEMBER REPORT [THAILAND]

ESCAP/WMO Typhoon Committee
17th Integrated Workshop
(Video conferencing)
29-30 November 2022

CONTENTS

I. Overview of tropical cyclones which have affected/impacted Member's area since the last Committee Session

1. Meteorological Assessment (highlighting forecasting issues/impacts)

1. Summary of tropical cyclones affected/impacted Thailand from 1 November 2021 to 31 October 2022

Thailand is located in the center of Southeast Asia mainland. The country's weather is influenced by the southwest monsoon in the rainy season (mid-May to mid-October) and the northeast monsoon in the winter season (mid-October to mid-February). Aside from these factors, there are also tropical cyclones from the Andaman Sea and the South China Sea.

In September 2022, Thailand was directly affected by NORU (2216), a tropical cyclone that originated in the northwest Pacific Ocean. It passed through the Philippines to reach the middle South China Sea and made landfall in Vietnam before moving further into Laos and entering Thailand, as shown in figure 1.

Moreover, there were 5 tropical cyclones over the South China Sea and the northwest Pacific Ocean taking some effects on rainfall of Thailand from 1 November 2021 to 31 October 2022, as shown in figure 2.

Those were: -
1. **"CHABA" (2203)** in July 2022
2. **"MULAN" (2207)** in August 2022
3. **"MA-ON" (2209)** in August 2022
4. **"SONCA" (2219)** in October 2022
5. **"NESAT" (2220)** in October 2022

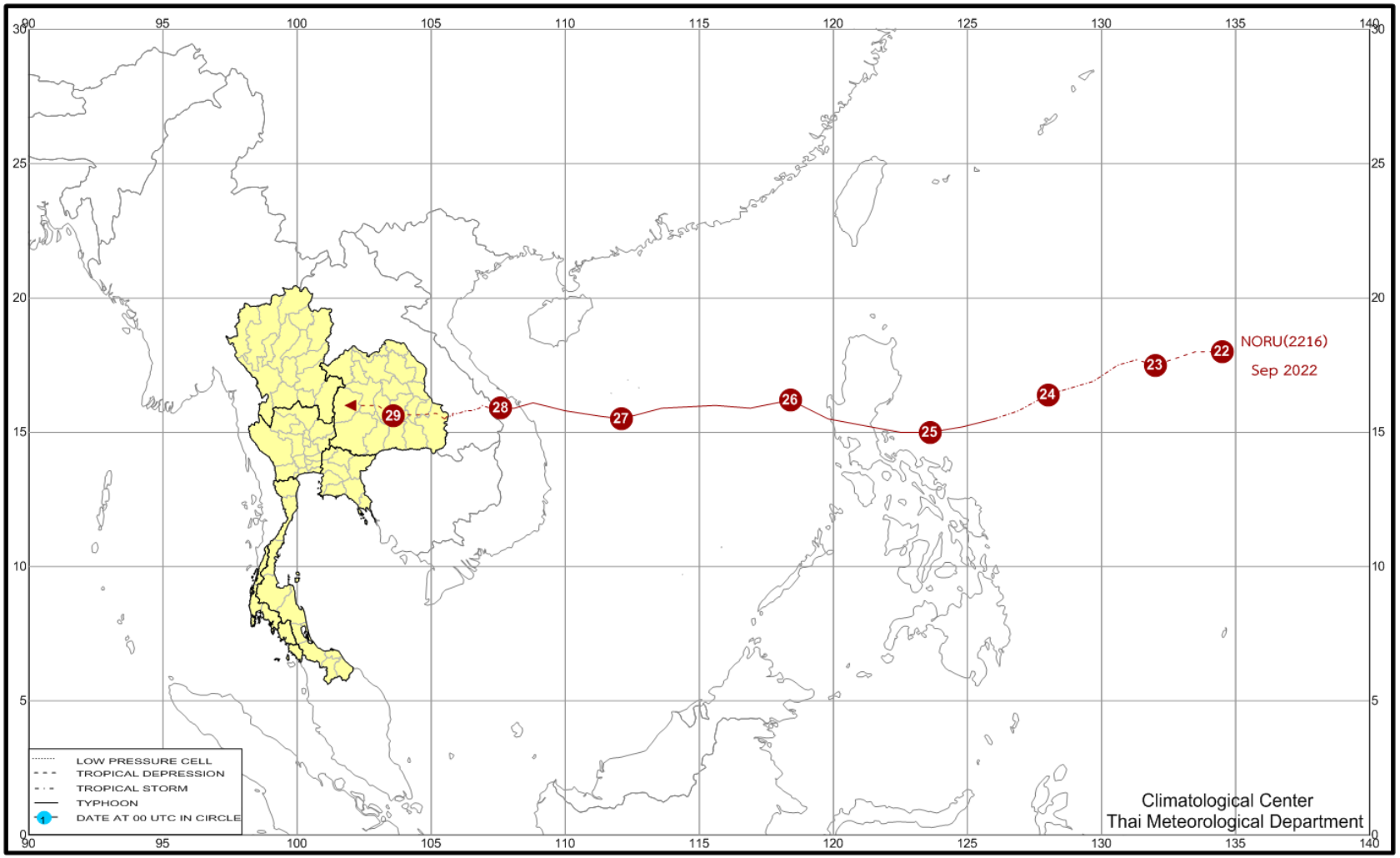


Figure 1: Track of Tropical cyclone “NORU” (2216) in September 2022

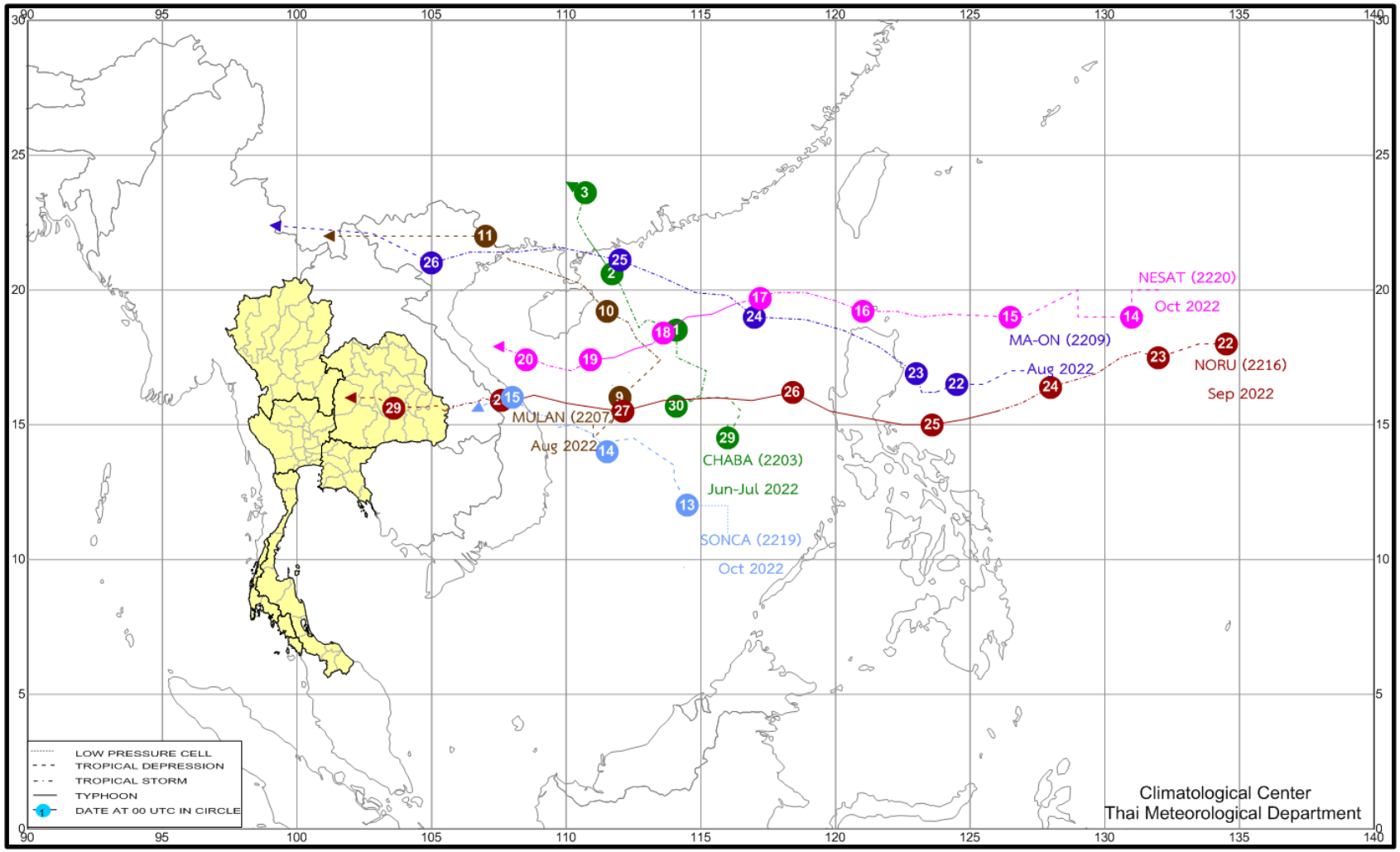


Figure 2: Tracks of tropical cyclones over the South China Sea and the northwest Pacific Ocean that affected on rainfall of Thailand from 1 November 2021 to 31 October 2022

2. Brief descriptions of the Tropical Cyclones impacted Thailand from 1 November 2021 to 31 October 2022 are given below:-

2.1 The tropical cyclone directly affected Thailand from 1 November 2021 to 31 October 2022 was “NORU” (2216) in late September 2022.

NORU was the only tropical cyclone entered Thailand in this period. It initially formed as a tropical depression in the northwest Pacific Ocean and intensified to tropical storm on September 23 before turning into a typhoon on the next day. The typhoon then moved westward through the Philippines to reach the middle South China Sea and made landfall at Hội An, Vietnam at the dawn of September 28. After that, it downgraded to the tropical storm before moving further to Laos and entering into Thailand at Khong Chiam, Ubon Ratchathani at 10:00 UTC on September 28. It downgraded to the tropical depression at 11:00 UTC on the same day and moved through Amnat Charoen, Yasothon, Roi Et, Maha Sarakham, Khon Kaen provinces, respectively and degenerated to an active low pressure cell in Chaiyaphum province at 12:00 UTC on September 29. The active low pressure cell from this storm covered lower northern, upper northeastern and central parts on the following day.

This storm brought plentiful rainfall in majority areas of upper Thailand especially on September 28 and 29 that received heavy to very heavy rainfall in several areas in the northeastern part and induced flooding in several areas during its passage. The highest daily rainfall in upper Thailand was 203.0 mm at Mueang Chan, Si Sa Ket on September 28. During that time, floods were reported in Phetchabun, Phichit, Amnat Charoen, Si Sa Ket, Yasothon, Ubon Ratchathani, Khon Kaen, Chaiyaphum, Nakhon Ratchasima, Buriram, Chainat, Saraburi, Sa Kaeo and Prachin Buri provinces and gusty wind was reported in Si Sa Ket, Mukdahan and Kalasin provinces. The accumulated amount of rainfall is shown in figure 3.

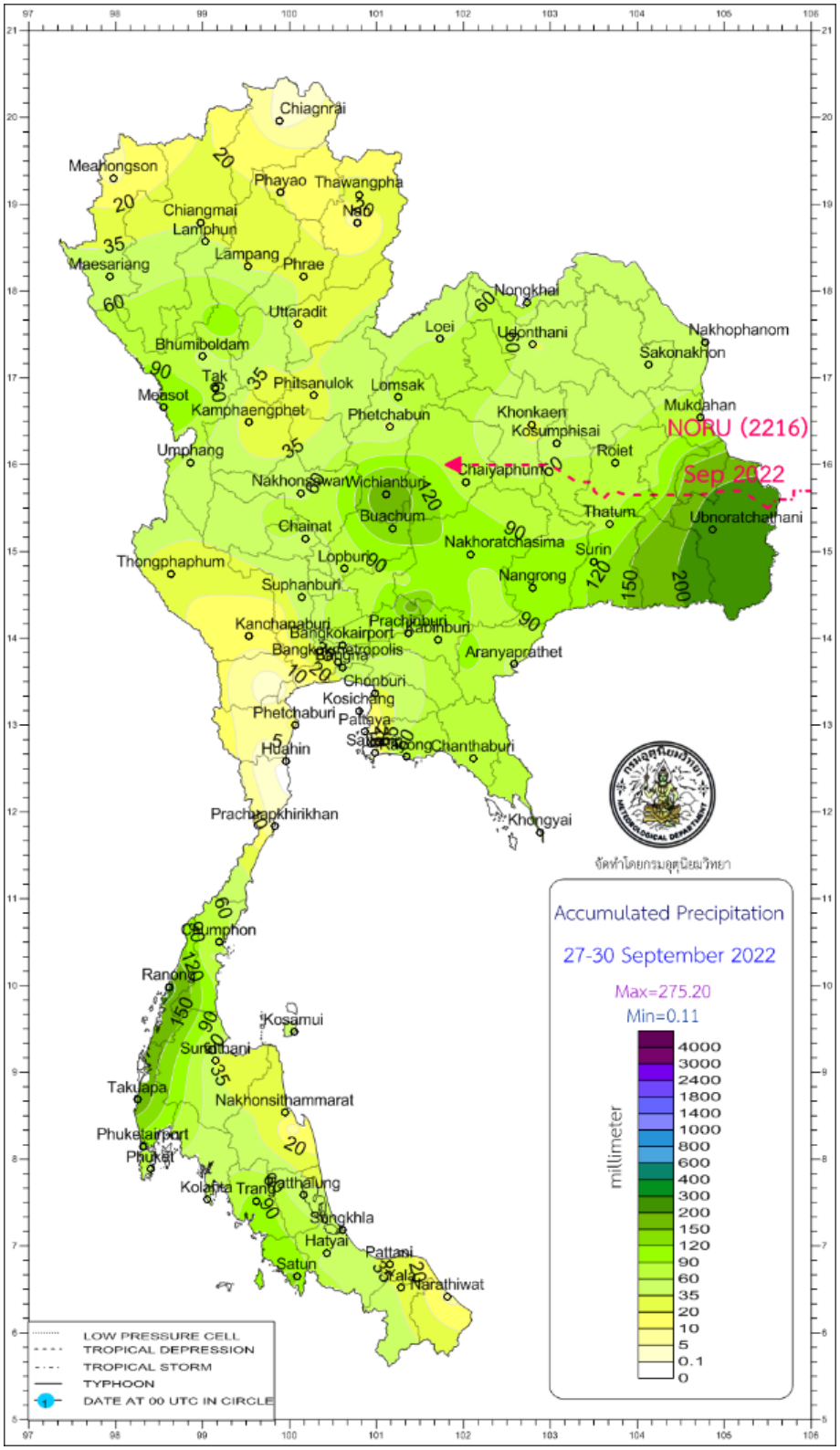


Figure 3: Accumulated amount of rainfall during 27-30 September 2022

2.2 The Tropical Cyclones taking some effects on rainfall of Thailand are given below:-

2.2.1 During late June to early July 2022, the tropical cyclone “CHABA” (2203) which formed from an active low pressure cell in middle South China Sea intensified to the tropical depression on June 29. Then it reached to the tropical storm on June 30 and intensified to a severe tropical storm in the morning of July 1. This storm moved slowly west-northwestward while upgrading to a typhoon over the upper South China Sea in the morning of July 2. It made landfall over Guangdong in southern China in the evening of the same day then downgraded to the tropical storm and tropical depression, respectively before dissipating in the evening of July 3. This storm did not directly affect the weather of Thailand.

2.2.2 In August 2022, there were 2 tropical cyclones having some effects on rainfall in Thailand, namely:

(1) Tropical cyclone “MULAN” (2207)

A low pressure cell in upper South China Sea developed to the tropical depression on August 8 and reached the tropical storm “MULAN” (2207) on August 9. This storm moved through the Gulf of Tonkin before making landfall over Quang Ninh in Vietnam on August 11 and downgraded to the tropical depression over Lạng Sơn, Vietnam on the same day. After that, it degenerated to an active low pressure cell over upper northern Thailand and Myanmar on August 12 and later dissipated.

This storm resulted in plentiful rainfall in upper Thailand especially on August 11 that received heavy to very heavy rainfall in several areas. The highest daily rainfall in upper Thailand was 217.3 millimeters at Mueang in Chiang Rai province on August 11 and flooding was reported in Chiang Rai, Mae Hong Son, Chiang Mai, Nan, Phayao, Lampang, Phare, Phitsanulok, Loei, Nakhon Phanom, and Prachinburi provinces.

(2) Tropical cyclone “MA-ON” (2209)

The second storm this month was the severe tropical storm “MA-ON” (2209) that made landfall over Maoming, Guangdong province, China in the morning of August 25. It moved through upper Vietnam and degenerated to the tropical depression before downgrading to the active low pressure cell over upper Laos on August 26.

This storm caused abundant rainfall over upper Thailand with flooding in several places. The highest daily rainfall in upper Thailand was 287.5 millimeters at Jae Hom in Lampang on August 25. Floods occurred at Lampang, Phetchabun, Khon Kaen, Maha Sarakham, Buriram, Udon Thani, Nakhon Ratchasima, Phra Nakhon Si Ayutthaya, Sa Kaeo and Nakhon Nayok provinces during that time. Gusty wind was reported in Phayao, Lampang, Lamphun, Sukhothai, Kamphaeng Phet, Udon Thani, Maha Sarakham, Kalasin, Prachinburi and Trat provinces on August 25, at Mae Hong Son and Ang Thong provinces on August 26.

2.2.3 In October 2022, Thailand was influenced by 2 tropical cyclones, those made landfall in Vietnam then dissipated nearby Thailand.

(1) Tropical cyclone “SONCA” (2219)

The first tropical cyclone in this month was the tropical cyclone “SONCA, 2219” which formed as a tropical depression in the middle South China Sea on October 13. It intensified to the tropical storm on the next day and made landfall at Quang Ngai, Vietnam at the dawn of October 15. After that, it downgraded to the tropical depression at Danang, Vietnam. This storm degenerated to the active low pressure cell covering Laos in the afternoon of the same day. SONCA resulted in fairly widespread rain in northern, northeastern and central parts of Thailand with heavy rainfall in some areas.

(2) Tropical cyclone “NESAT” (2220)

A few days after SONCA dissipated, the tropical storm “NESAT” in upper South China Sea intensified to the typhoon on October 17. This storm approached Hainan Island before downgrading to a tropical storm in the morning of October 19. It moved through southern Hainan Island and degenerated to a tropical depression and then an active low pressure cell over coast of upper Vietnam in on October 20. It induced light to moderate rain in some areas of eastern Thailand on October 20.

2. Hydrological Assessment (highlighting water-related issues/impact)

In 2022, from January to October, Thailand confront with 5 tropical storms that weaken into depression and strong low pressure cell as: 1) MULAN (2207), on 9-11 August 2022, affected to Chiangrai, Nan, Maehongson, Phitsanulok, Phetchabun, Loei, Sakaew and Prachinburi; 2) MA-ON (2209), on 24-26 August 2022, affected to Lampang, Udonthani, Khonkaen, Chaiyaphum, Ubonratchathani, Nakhonnayok, Rayong and Ayuthtaya; and 3) NORU (2216), on 27-29 September 2022, major affected to Mun river (Ubonratchathani province), Pasak and Chaophraya river (many provinces in the Central Part and Ping river in Chiangmai also impacted; and 4) SONCA (2219) on 14-21 October 2022, affected to the inundation area in Northeastern, Central and made flood occurred in Southern part of Thailand. In addition, the strong monsoons caused more than 100 hydrological stations and around 60 provinces flooded in Thailand.

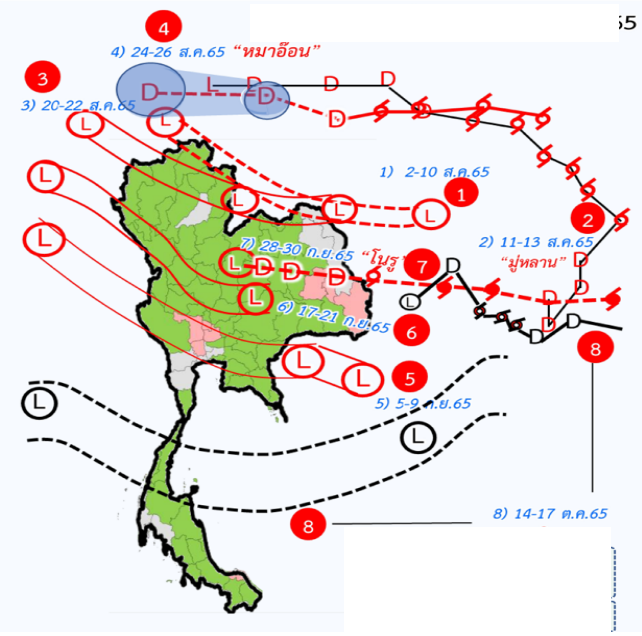


Figure 4: Summary of Flood Situation in Thailand 2022

Description of Figure 4:

1) The active low cell covers northern Thailand, and the monsoon trough lies across the North and the Northeast of the country.

2) The influence of Tropical Storm "Mulan"

3) The monsoon trough lies across the North and the Northeast of the country.

4) Depression "Ma On" weakens into a low-pressure area in the country.

5) and 6) The active low cell covers Central and Eastern Thailand, and the monsoon trough lies across the Gulf of Thailand.

7) The tropical cyclone “NORU” directly affected the Northeastern Thailand

8) The monsoon trough lies across the South of the country and the weaken “SONCA” to the low-pressure cell.

Figure 5: Effect of MULAN in August

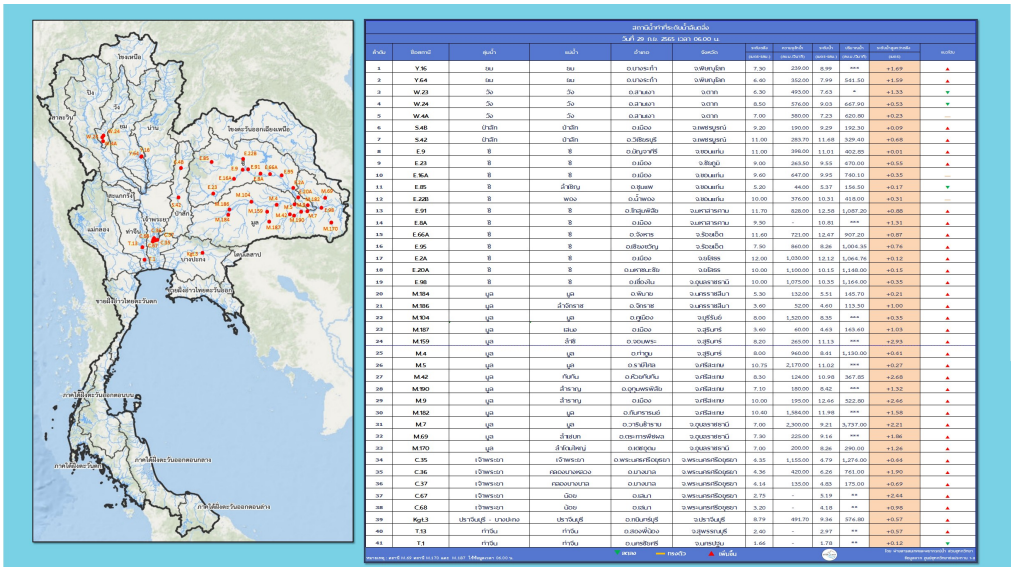


Figure 6: The hydrology stations flood during NORU

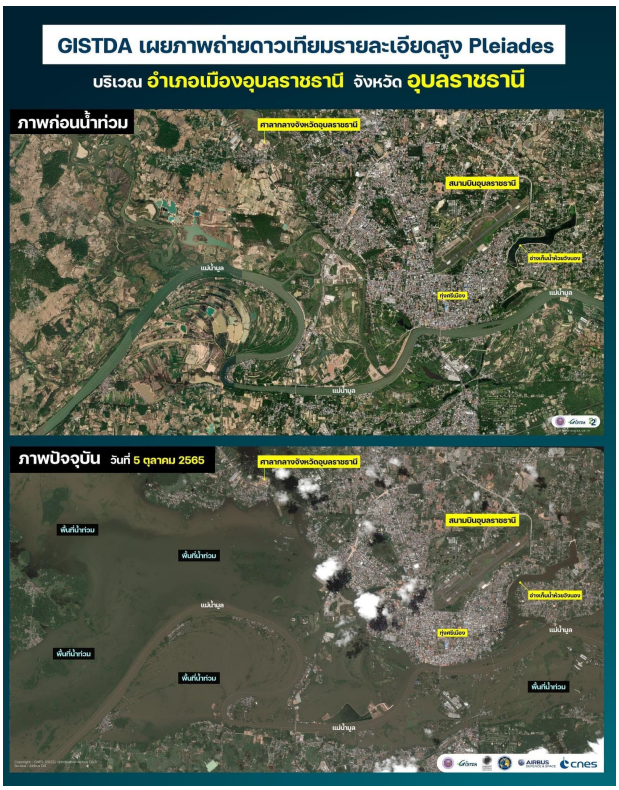
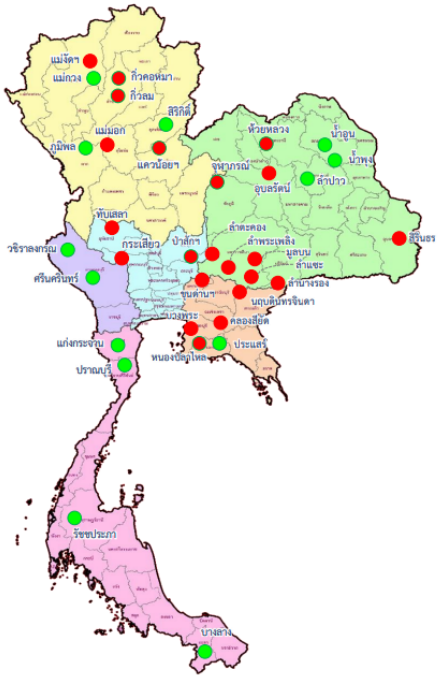


Figure 7: The satellite photo compares Ubon Ratchathani before and during flood from NORU.

Figure 8: The capacity of 35 large-scale Dams in early October.



Description of Figure 8: From 35 large-scale dams, 22 dams were over URC and 2 dams reported over capacity.

The Royal Irrigation Department (RID), Office of National Water Resources and related agencies were working together on monitoring, analyzing, providing information and supporting the instruments and technology to the community

3. **Socio-Economic Assessment (highlighting socio-economic and DRR issues/impacts)**

Overview of Tropical Cyclones which had affected/impacted member's area from 1 November 2021 to 31 October 2022 by Department of Disaster Prevention and Mitigation (DDPM), Thailand.

3.1 Tropical Cyclone "NORU" (2216)

NORU was the only tropical cyclone that entered Thailand in this period. This typhoon downgraded to the tropical storm at 10:00 UTC on September 28 and downgraded to tropical depression at 11:00 UTC on the same day and started moving through Thailand. It degenerated to active low pressure cell in Chaiyaphum province at 12:00 UTC on September 29.

Department of Disaster Prevention and Mitigation (DDPM), Thailand reported that tropical cyclone "NORU" (2216) caused a flash flood and landslide that affected 240,066 households across 262 districts, 1,237 subdistricts and 4,377 villages in 54 provinces (Tak, Phetchabun, Phichit, Nakhon Sawan, Chaiyaphum, Khon Kaen, Maha Sarakham, Kalasin, Roi Et, Yasothon, Nakhon Ratchasima, Buri Ram, Surin, Si Sa Ket, Ubon Rachathani, Uthai Thani, Chai Nat, Sing Buri, Ang Thong, Ayutthaya, Pathum Thani, Lopburi, Nakhon Pathom, Nakhon Nayok, Pachin Buri and others)

3.2 In August 2022, there were 2 tropical cyclones having some effects on rainfall in Thailand which affected member's areas as follows:

(1) Tropical Cyclone "MULAN" (2207)

The tropical cyclone "MULAN" (2207) formed from low pressure cell to the tropical depression and reached the tropical storm on August 9. It downgraded to the tropical depression and finally degenerated to an active low pressure cell over upper northern Thailand on August 12. This storm caused flooding in widespread areas which affected 33,567 households with 1 dead across 51 districts, 179 subdistricts, 1,153 villages, 3 local government organizations and 11 communities in 18 provinces (Kalasin, Khon Kaen, Chanthaburi, Chiang Rai, Chiang Mai, Nakhon Nayok, Nakhon Phanom, Nakhon Sawan, Nan, Prachin Buri, Phichit, Phitsanulok, Mae Hong Son, Lampang, Loei, Si Sa Ket, Saraburi and Ubon Rachatani)

(2) Tropical Cyclone "MA-ON" (2209)

The tropical cyclone "MA-ON" (2209) downgraded to the active low pressure cell on August 26. It caused abundant rainfall over upper Thailand with flooding in several places which affected 11,952 households with 1 dead across 68 districts, 160 subdistricts, 713 villages, 7 local government organizations and 16 communities in 32 provinces (Krabi, Kamphaeng Phet, Chanthaburi, Chachoengsao, Chiang Rai, Chiang Mai, Tak, Nakhon Nayok, Nakhon Ratchasima, Nakhon Sawan, Nan, Buri Ram, Pathum Thani, Prachin Buri, Ayutthaya, Phichit, Phitsanulok, Phetchaburi, Phrae, Phuket, Maha Sarakham, Mae Hong Son, Roi Et, Rayong, Lampang, Loei, Si Sa Ket, Sa Kaew, Saraburi, Sukhothai, Udon Thani and Ubon Ratchathani).

3.3 In October 2022, Thailand was influenced by 2 Tropical Cyclones as follows.

(1) Tropical Cyclone "SONCA" (2219)

The tropical cyclone "SONCA" (2219) formed as a tropical depression in the middle South China Sea on October 13. It later downgraded to a tropical depression, resulting in fairly widespread rain in northern, northeastern and central parts of Thailand with heavy rainfall in some areas, which affected 8,174 households across 53 districts, 122 subdistricts, 537 villages, 4 local government organizations and 5 communities in 28 provinces (Kanchanaburi, Kalasin, Chachoengsao, Chai Nat, Chiang Rai, Trang, Tak, Nakhon Pathom, Nakhon Ratchasima, Nakhon Sawan, Phayao, Phichit, Phetchaburi, Maha Sarakham, Mae Hong Son, Yasothon, Rayong, Ratchaburi, Lampang, Samut Songkhram,

Samut Sakhon, Sa Keaw, Saraburi, Sing Buri, Suphan Buri, Nong Bua Lamphu, Ang Thong, Uthai Thani).

(2) Tropical Cyclone “NESAT” (2220)

A tropical storm “NESAT” intensified to typhoon on October 17. This storm downgraded to tropical storm in the morning of October 19 and degenerated to tropical depression and then active low pressure cell on October 20. It induced light to moderate rain in some areas of eastern Thailand.

DDPM Thailand reported that this tropical storm affected 7,285 households across 114 districts, 459 subdistricts, 2 local government organizations and 4 communities in 16 provinces (Krabi, Karasin, Chai Nat, Chumphon, Trang, Nakhon Pathom, Nakhon Si Thammarat, Narathiwat, Phangnga, Phichit, Phuket, Songkhla, Satun, Suphan Buri, Surat Thani and Uthai Thani).

II. Summary of Progress in Priorities supporting Key Result Areas

1. IMO Member State Audit Scheme (IMSAS)
2. Office of the National Water Resources (ONWR) Roles in Thailand
3. DDPM integrated all provinces to prepare for the upcoming storms
4. DDPM expanded the channels for disaster communications
5. Installation and Maintenance of the Early Warning Equipment

1. IMO Member State Audit Scheme (IMSAS)

Main text:

Due in 2023, there will be a compulsory inspection by the International Maritime Organization (IMO) which is called the IMO Member State Audit Scheme (IMSAS). For Thailand, this activity will be directly responsible by the Marine Department (MD). The representatives from the Thai Meteorological Department (TMD) join the subcommittee on the preparation of strategies to implement the international convention obligations of the International Maritime Organization.

The content of the audit will include regulations on meteorological services to the maritime of the country being audited. In order to prepare for the assessment, TMD has cooperated with MD to recruit 71 Voluntary Observing Ship (VOS) and provide training in making observation from VOS. These vessels will observe and transmit weather data to TMD for increasing the amount of weather data in the sea, which is the area that has little weather data. More weather data from the sea can therefore greatly improve the accuracy of weather forecasts.

In April 2022, TMD also organized an online training course on weather observation for recruited VOS. The objectives were to train them how to carry out the accurate weather observation and transmit the data to TMD.

Furthermore, TMD has coordinated with MD for providing services of instrument and calibration and inspection by Port Meteorological Officers (PMOs) as well as transmission the maritime weather data to TMD. These reports are very important, the observed data will be distributed to the World Meteorological Organization members via GTS also. The operation has been very successful and the volunteer ships send the marine weather information to the TMD regularly.

Identified opportunities/challenges, if any, for further development or collaboration:

1. It is the opportunity for Thailand to being audited by the IMO in 2023. The cooperation between other organizations like the Marine Department (MD) making the VOS happen easily because we have an MOU with MD to support this operation.
2. TMD will receive weather observing data from ships at sea.
3. It is the way to create the VOS's incentives and TMD will receive the observed data continuously.

Priority Areas Addressed:

Integrated

- Enhance collaborative activities with other regional/international frameworks/organizations.

Meteorology

- Enhance the capacity to monitor and forecast typhoon activities particularly in genesis, intensity and structure change.

Contact Information:

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2. Office of the National Water Resources (ONWR) Roles in Thailand

Main text:

ONWR (Office of The National Water Resources) was instituted on October 25th 2018 regarding the Order Number 46/2560 issued by the Chief of the National Council for Peace and Order (NCPO) in compliance the State Administration Act, B.E.2534(1991)'s Section 8 sexies, which was amended by B.E.2543 (2000). The Prime Minister issued the Ministerial Regulation, specifying powers and duties of Office of the National Water Resources as organization being a data center to screen, supervise and suggest policy and direction for water resources management in a coherently integrated manner. To cooperation with more than 38 water resources management agencies explain by this chart.

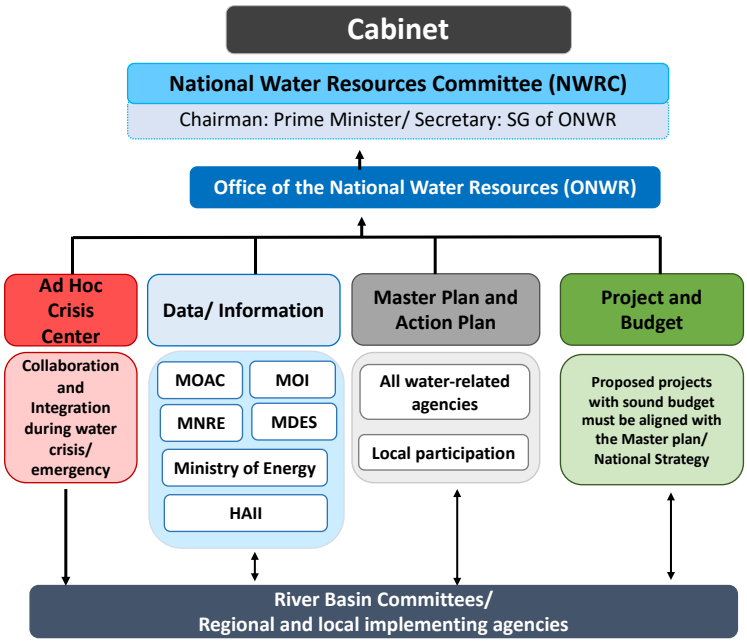

Figure 9: The institutional framework for Water Resources Management

Identified opportunities/challenges, if any, for further development or collaboration:

Before rainy season 2022, the cabinet accept 13 Measures for rainy season 2022 by the National Water Resources Committee (NWRC) meeting.

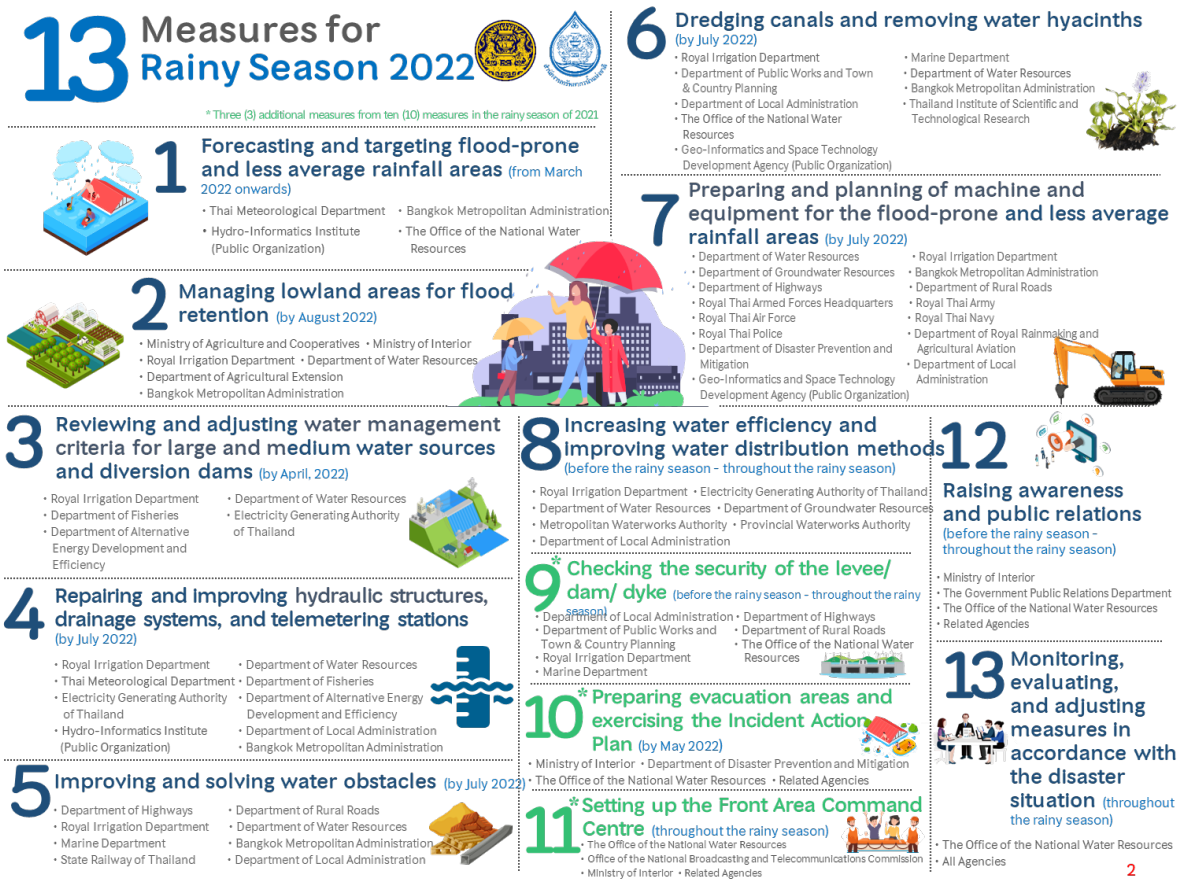

Figure 10: 13 Measures for Rainy Season 2022 from The Office of the National Water Resources (ONWR)

1.Forecasting and targeting flood-prone and less average rainfall areas
2.Managing lowland areas for flood retention
3.Reviewing and adjusting water management criteria for large and medium water resources and diversion dams
4.Repairting and improving hydraulic structures, drainage systems, and telemetering stations
5.Improving and solving water obstacles
6.Dredging canals and removing water hyacinths
7.Preparing and planning of machine and equipment for the flood-prone and less average rainfall areas
8.Increasing water efficiency and improving water distribution methods
9.Checking the security of the levee/dam/dyke
10.Preparing evacuation areas and exercising the incident Action Plan
11.Setting up the Front Area Command Centre
12.Raising awareness and public relations
13.Monitoring, evaluating, and adjusting measures in accordance with the disaster situation

Rainy season 2022, TMD announce rainy season onset start on13 May 2022. On September 2022. The National Water Command Centre (NWCC) will appoint a frontline water management working unit to tackle floods in the Northeastern and Central regions. ONWR in charge of the secretariat of NWRC. the ONWR has joined hands with the Thai Meteorological Department and the Hydro-Informatics Institute to create One Map for predicting rains. They will prepare, monitor, analyze, and direct local organizations to manage the water until the situation improves.

Priority Areas Addressed:

Integrated

- Strengthen the cooperation between TRCG, WGM(TMD), WGH(RID), and WGDRR(DDPM) to develop impact-based forecasts, decision-support and risk-based warning.

Meteorology

- Enhance and provide typhoon forecast guidance based on NWP including ensembles, weather radar and satellite related products, such as QPE/QPF.

Hydrology

- Enhance capacity in typhoon-related flood risk management (including land-use management, dam operation, etc.) and integrated water resources management and flood-water utilization.
- Strengthen capacity in effective flood forecasting and impact-based early warning, including hazard mapping and anticipated risk based on methodological and hydrological modelling, and operation system development.

Contact Information:

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3. DDPM integrated all provinces to prepare for the upcoming storms

Main text:

- Preparedness

(1) Monitoring the real-time situation

By organizing staffs to closely monitor weather changes and risk factors from the Thai Meteorological Department and coordinate officials from local government organizations to notify the public accordingly in case there is a storm coming.

(2) Checking the building strength

By having provinces, districts and local government organizations inspect buildings, structures and trees in public areas. If there are unsafe conditions, they will notify relevant agencies to take corrective action to ensure stability and safety and also invite people or volunteers to look after their living areas to be safe.

(3) Preparing the disaster response

By organizing personnel, tools, materials, equipment and machineries to be ready to respond to emergencies or disasters quickly.

(4) Raising awareness of people

By sharing disaster information, trends, situations and warnings. And providing knowledges such as the guideline to handle or survive from a storm including measures to look after people and channels for requesting assistance from the government via various channels such as online social media, community radio, village broadcasting towers and volunteer networks.

- Response and Mitigation

If a storm affects the area, DDPM will expedite the damage assessment to help affected people according to relevant regulations and criteria as soon as possible which are divided as follows:



(1) In case of the house damages

By integrating related agencies, share missions and responsibility areas in the form of the "Pracharath Team" to accelerate the repair of affected houses.



(2) In case of the billboards, buildings, woody plants, and infrastructures damages

By coordinating with relevant agencies and local government organizations to repair as soon as possible and also to clear any obstructions in public areas and transportation routes.



(3) In case of agricultural products damages

Districts and local government organizations will work with agencies under the Ministry of Agriculture and Cooperatives to do the damage assessment and provide agricultural assistance in accordance with relevant criteria.

Identified opportunities/challenges, if any, for further development or collaboration:

Sometimes, people are too much depending on the government's assistance especially the relief money (aid). Although they get affected by the same disaster every year, but they don't choose to fix the problem or increase their capacities to be resilient to disasters.

Priority Areas Addressed:

DRR

- Share experience/knowhow of DRR activities including legal and policy framework, community-based DRR activities, methodology to collect disaster-related information.

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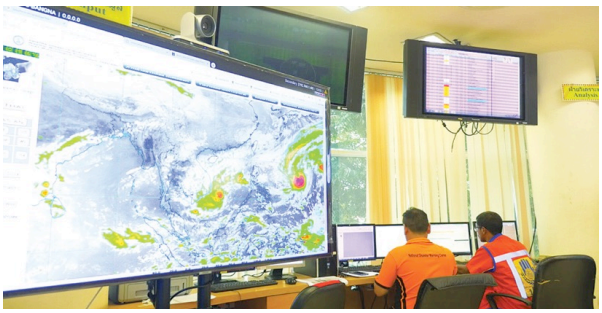
4. DDPM expanded the channels for disaster communications

Main text:



DDPM expanded the channels for disaster communications via the social media (Facebook, Line and Twitter) and mobile applications ("Thai Disaster Alert", "DDPM Reporter" and "Arsasamakguphai") in order to raise the public awareness on disasters by applying digital transformation in accordance with disaster management especially in the dimension of disaster communication. Nowadays, it is not just the one-way communication as people can be the reporter themselves which means they can report information, photos and locations of disasters or emergencies directly via Line in real-time. On this channel, we have the official standby 24 hours to coordinate and assist affected people immediately. On the other hand, DDPM uses this channel for warning and informing disaster situations to the public.


Facebook


Line


Twitter

Recently, DDPM has developed a new application called “Thai Disaster Alert”. The application provides in-depth warning information which accesses specific areas expected for disasters in real-time. Then, people can be prepared to respond the upcoming disasters in time which also helps in the reduction of their impacts.

Thai Disaster Alert


DDPM Reporter


Arsasamakguphai

Identified opportunities/challenges, if any, for further development or collaboration:

The limitation of accessing the provided relief channels such as the DDPM’s Official Line which can inform the officials on real-time when someone are affected by disasters. Since not everyone is able to use nowadays technologies especially the elderly people.

Priority Areas Addressed:

Integrated

- Strengthen the cooperation between TRCG, WGM(TMD), WGH(RID), and WGDRR(DDPM) to develop impact-based forecasts, decision-support and risk-based warning.

Hydrology

- Increase capacity in utilization of advanced science and technology for typhoon-related flood forecasting, early warning, and management.

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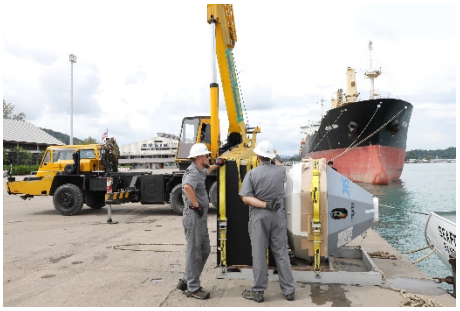
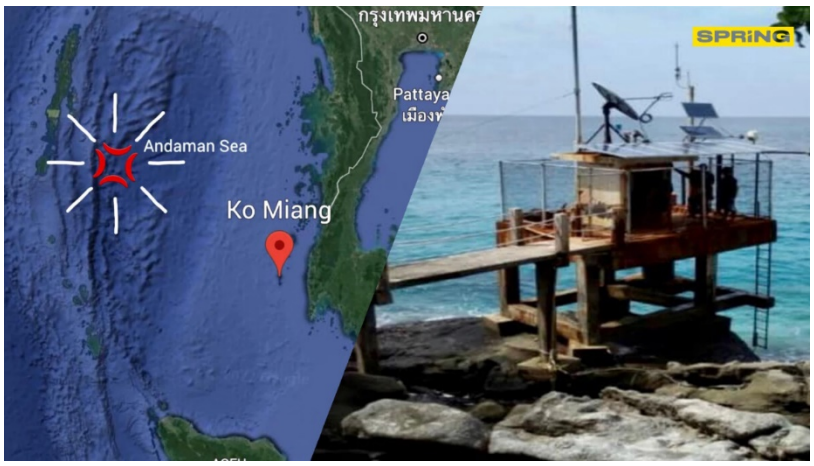
5. Installation and Maintenance of the Early Warning Equipment

Main text:

5.1 DDPM normally maintains the capacity of the tsunami buoys every 2 years. Recently, we have reinstalled 2 tsunami buoys instead of the missing buoys at Station No. 23401 and 23461 in Phuket Province, Thailand.

5.2 DDPM has carried out the project of installing a water level meter with equipment at Koh Miang, Phang Nga Province and Ko Racha Noi, Phuket Province. It is the system to manage and display water level by sending automatic data for situation analysis serving as the last-mile tsunami warning.



Identified opportunities/challenges, if any, for further development or collaboration:

There are the complexity and too much time consuming to return the missing tsunami buoy. Another problem is we are lacking of the professionals who truly know and understand the buoy system in technical term.

Priority Areas Addressed:

Integrated

- Strengthen the cooperation between TRCG, WGM(TMD), WGH(RID), and WGDRR(DDPM) to develop impact-based forecasts, decision-support and risk-based warning.

Hydrology

- Increase capacity in utilization of advanced science and technology for typhoon-related flood forecasting, early warning, and management.

Contact Information:

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