MEMBER REPORT
Lao PDR

ESCAP/WMO Typhoon Committee
13th Integrated Workshop
Chiang Mai, Thailand
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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)

The year 2018, the onset monsoon in Lao PDR started earlier than normal from the north to central parts whereas the southern part started near normal, the strongest monsoon period was from July to August and associated with tropical cyclones, resulted there were lots of rain in June to August 2018, as a result the severe weather occurred during this period resulted flash flood, landslides and flood in many places in Loa PDR. But the monsoon rain finished earlier than normal, the northern part finished from 2nd week of September while the central and southern parts finished 3rd week of September (the normal finished in mid-October), resulted there were little rain in October from north to south of the country. The annual rainfall of the year 2018 (from January to October 2018) was mostly above normal, the percentage of annual rainfall for the whole country is above normal 35.4 percent.

The table 1 shown the accumulated rainfall from January to October 2018 for each province/district by comparing to normal data.

Province/ District	**Accumulated rainfall (mm)**			**Percentage of rainfall from Jan – Oct 2018 (%)**
	Jan – Oct 2018	**Normal (Jan – Oct)**	**Normal (annual)**	
Phongsaly	2,115.1	1,527.1	1,589.6	**Northeastern Part**
Viengxay	2,198.2	1,503.5	1,556.6	
Xamneua	2,293.6	1,265.1	1,282.3	**142.8**
Xiengkhuang	1,699.1	1,408.9	1,437.6	
Oudomxay	1,682.9	1,380.3	1,430.4	**Northwestern Part**
Luangnamtha	1,904.6	1,451.2	1,518.6	
Bokeo	2,188.9	1,821.3	1,873.4	**130.0**
Luangprabang	1,603.4	1,268.8	1,309.9	
Xaiyabouly	2,198.6	1,277.8	1,312.5	
Phonhong	1,583.4	2,261.3	2,283.4	**Central Part**
Vientiane	3,102.6	1,656.2	1,671.1	
Paksanh	2.877.4	3,019.3	3,036.9	
Lak 20	2,703.9	1,613.3	1,620.7	**126.6**
Thakhek	2,031.8	2,168.6	2,187.3	
Savannakhet	1,735.0	1,459.7	1,470.6	
Seno	2,533.8	1,587.9	1,594.8	
Pakse	4,190.6	1,960.1	1,983.5	**Southern Part**
Paksong	3364.5	3,352.3	3,432.1	
Salavanh	3,033.4	2,010.4	2,029.8	**142.1**
Attapeu	1,868.2	2,158.7	2,185.6	
Sekong	2,476.7	1,456.3	1,487.6	
Average	**2,351.7**	**1,790.9**	**1,823.5**	**135.4**

As the climate characteristic in Lao PDR is influent by Southwest Monsoon and associated with direct and/or indirect of Tropical Cyclone from Western North Pacific and from the South China Sea. As a result, in 2018, there were two tropical cyclones direct impacted namely Son-Tinh number 9 and Bebinca number 16, and one tropical cyclone indirect impacted namely Mangkhut number 22.

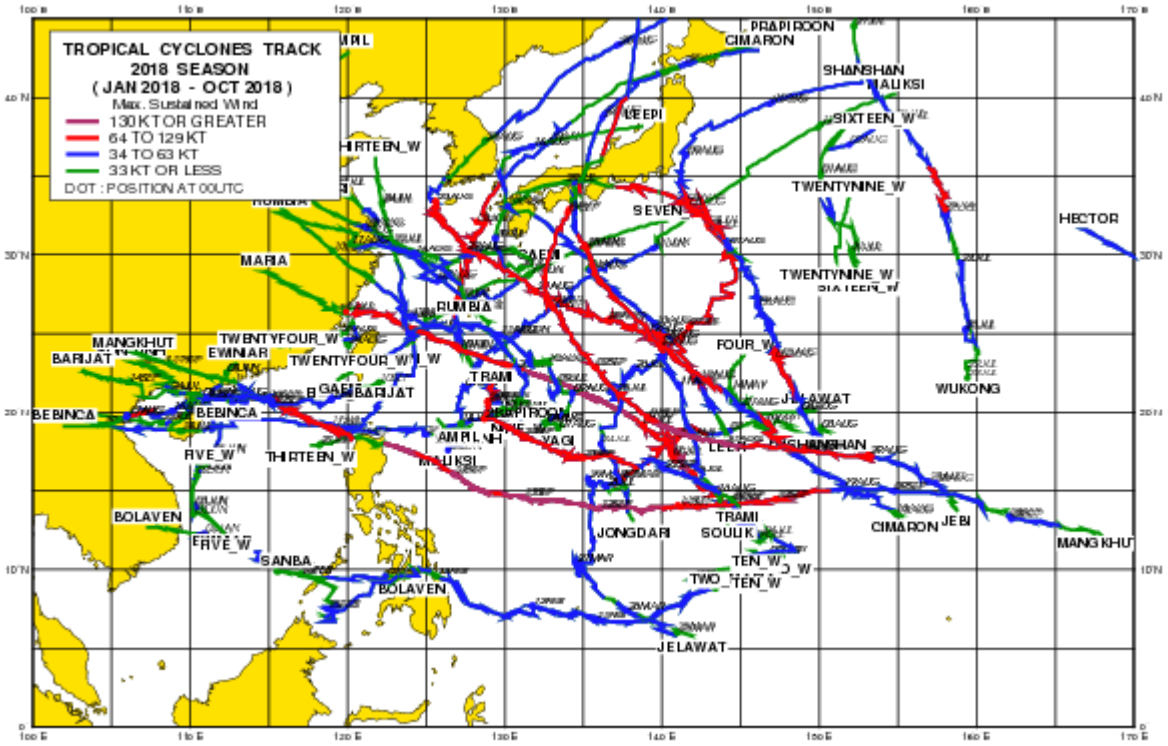


Figure 1: Tropical Cyclones Track for 2018 over Western North Pacific

Table 2: Tropical cyclone name over Western North Pacific from Jan – Dec 2018

Month	TC Number	TC Name	Contributed by	Total
Jan	1	BOLAVEN	Lao PDR	1
Feb	2	SANBA	Macao, China	1
Mar	3	JELAVAT	Malaysia	1
Jun	4	EWINIAR	Micronesia	4
	5	MALIKSI	Philippines	
	6	GAEMI	RO Korea	
	7	PRAPIROON	Thailand	
Jul	8	MARIA	U.S.A	5
	9	SON-TINH	Viet-Nam	
	10	AMPIL	Cambodia	
	11	WUKONG	China	
	12	JONGDARI	PDR Korea	
Aug	13	SHANSHAN	Hong Kong, China	8
	14	YAGI	Japan	
	15	LEEPI	Lao PDR	
	16	BEBINCA	Macao, China	

	17	RUMBIA	Malaysia	
	18	SOULIK	Micronesia	
	19	CIMARON	Philippines	
	20	JEBI	RO Korea	
Sep	21	MANGKHUT	Thailand	4
	22	BARIJAT	U.S.A	
	23	TRAMI	Viet-Nam	
	24	KONG-REY	Cambodia	
Oct	25	VICENTE		
	26	YUTU	China	2
Total (as October 2018)				**26**

Source: http://tparc.mri-jma.go.jp/cyclone/index.php

➢ **Tropical cyclone Son-Tinh (TS1809)**: Son-Tinh was the first tropical cyclone affecting Lao PDR in 2018 and it was tropical cyclone number 9 over the western North Pacific Ocean in 2018.

Son-Tinh formed as a tropical depression over the western North Pacific about 650 km northeast of Manila on the morning of 16 July and moved quickly westwards across the Luzon Strait on that day. It continued to move at a fast pace after entering the northern part of the South China Sea on 17 July. Son-Tinh intensified into a tropical storm before noon, reaching its peak intensity with an estimated sustained wind of 85 km/h near the centre on the early morning of 18 July. After moving across Hainan Island and Beibu Wan (https://www.weather.gov.hk/informtc/son-tinh18/report.htm) , Son-Tinh made landfall over the northern part of Vietnam on 19 July and its remnant continued to track westward further inland on that day then continued passing Central to Northern parts of Lao PDR at this night. The low pressure area associated with the remnant of Son-Tinh made a sharp turn to the east over the Indo-China and moved towards Beibu Wan on 20 July. It re-intensified into a tropical depression over Beibu Wan on 22 July and took a northeasterly track, sweeping across the northwestern part of Hainan Island. Son-Tinh then turned north and moved across Leizhou Peninsula on 23 July, before dissipating over Guangxi on 24 July 2018

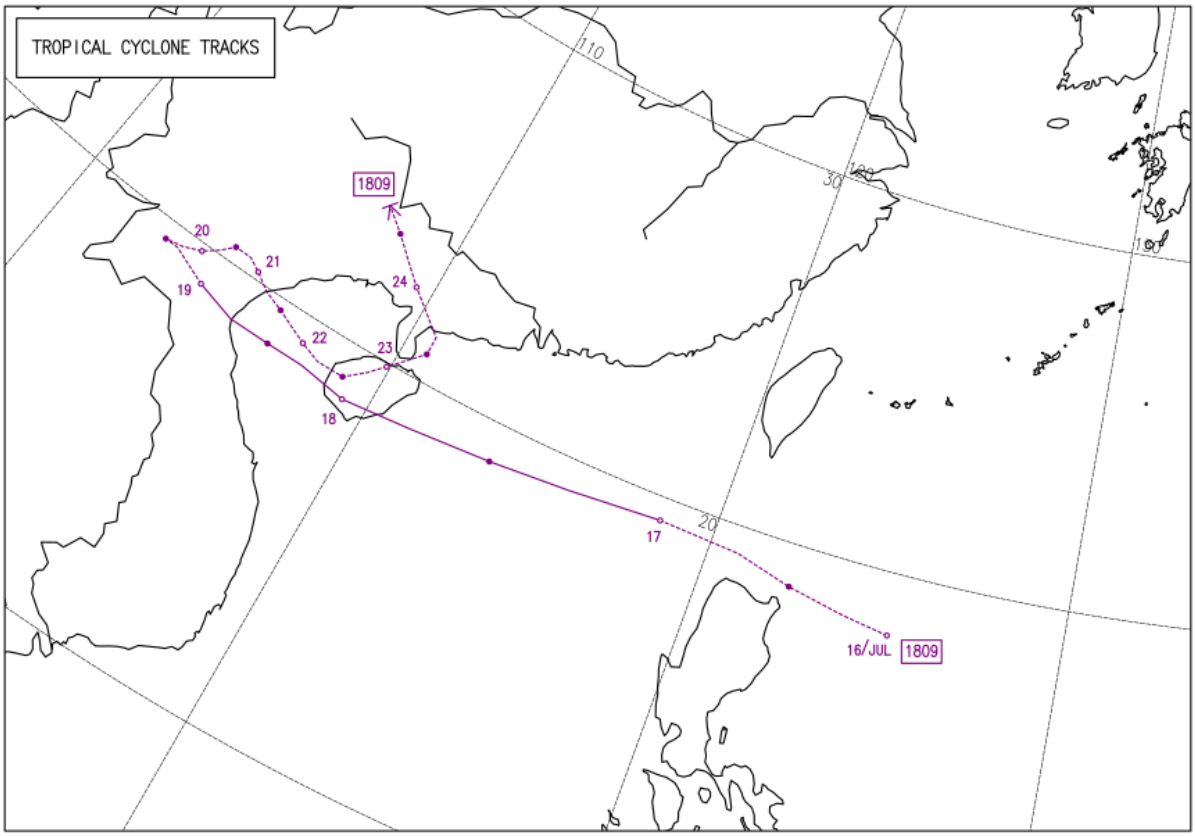


Figure 2: Best track of Son-Tinh (TS1809)

During the passage of Son-Tinh, there was heavy rain with strong winds. As a result, there were landslides, flash flood and floods in some areas.

Table 2: shown the daily rainfall amount recorded during the passage of Son-Tinh over Lao PDR from 17 July to 25 July 2018

Station	17 Jul	18 Jul	19 Jul	20 Jul	21 Jul	22 Jul	23 Jul	24 Jul	25 Jul	Total (mm)
phongsaly	2.5	0.2	2.9	62.5	9.1	26.7	0.3	7.9	30.2	142.3
Viengxay	12.0	18.2	90.9	47.5	42.0	00	00	00	15.6	226.2
Xamneua	7.1	15.2	119.2	64.2	23.5	00	00	00	20.4	249.6
Xiengkhuang	8.6	11.3	291.6	60.8	53.3	5.4	3.2	25.3	50.1	509.6
Luangnamtha	28.2	00	34.7	54.2	19.0	00	6.6	1.4	2.3	146.4
Muang Sing	00	00	24.3	21.0	00	00	12.0	1.1	7.0	65.4
Viengphoukha	3.2	00	64.9	56.6	6.1	0.0	24.3	38.3	5.2	198.6
Oudomxay	0.1	0.4	7.2	78.5	22.5	1.5	6.9	30.2	6.0	153.3
Bokeo	4.2	8.1	70.3	36.8	13.0	0.2	6.3	23.1	12.3	174.3
Luangprabang	00	2.2	161.0	75.8	81.9	00	00	98.0	7.9	426.8
Xaiyabouly	00	00	83.2	34.8	0.2	5.2	00	20.5	3.4	147.3
Vientiane	7.0	3.7	26.6	5.8	4.2	00	7.2	4.8	3.4	62.7
Xaysomboun	3.6	3.6	69.5	5.9	23.0	10.3	13.4	38.1	88.7	256.1
Phonhong	7.4	3.3	36.1	31.8	25.7	00	00	9.7	6.6	120.6

Paksanh	12.9	22.2	112.2	54.2	16.3	0.2	3.6	5.6	46.4	273.6
Lak 20	87.8	72.8	6.7	23.5	21.7	4.8	00	59.4	29.2	305.9
Viengthong	17.2	20.6	75.9	58.8	29.7	0.4	14.0	1.8	18.3	236.7
Thakhek	8.7	18.8	4.6	3.5	24.8	18.4	9.8	22.2	36.6	147.4
Savannakhet	88.9	18.2	00	00	3.6	5.6	00	14.8	21.6	152.7
Seno	42.7	21.1	3.2	00	10.3	6.5	7.4	11.3	20.8	123.3
Salavanh	19.8	36.4	12.2	6.6	2.4	106.8	50.2	26.4	17.7	278.5
Pakse	43.6	44.4	11.1	10.0	4.2	3.2	14.7	16.0	28.0	175.2
Paksong	35.2	10.4	31.0	30.0	48.7	159.2	92.2	110.2	37.6	554.5
Nikom 34	4.2	72.5	32.3	15.4	15.0	119.7	28.3	58.8	15.1	361.3
Sekong	1.0	51.5	3.5	14.0	1.8	28.1	13.5	23.0	3.8	140.2
Thateang	25.0	31.5	NT	10.5	7.2	25.7	3.5	20.5	0.5	124.4
Dakjung	19.3	19.3	10.3	5.9	16.3	38.0	28.7	1.2	10.7	149.7
Attapeu	3.3	13.3	2.1	7.4	122.2	31.8	14.6	51.1	9.9	255.7

- **Tropical cyclone Benica (STS1816):** Bebinca was the second tropical cyclone affecting Lao PDR in 2018 and it was tropical cyclone number 16 over the western North Pacific Ocean in 2018.

Bebinca formed as a tropical depression over the northern part of the South China Sea about 540 km southwest of Hong Kong. Moving slowly northwards, it made landfall near Yangjiang of western Guangdong around noon on 11 August. Bebinca then made an anti-clockwise loop over the coastal region of western Guangdong and moved back to the coastal waters that night. After drifting southeastwards on 12 August, Bebinca intensified into a tropical storm and looped slowly in anti-clockwise direction off the coast of western Guangdong on 13 and 14 August. Bebinca picked up speed to move west-southwestwards and intensified into a severe tropical storm on 15 August, reaching its peak intensity with an estimated sustained wind of 90 km/hr near its centre. It moved across Beibu Wan the next day. Bebinca made landfall over the northern part of Vietnam on 17 August 2018 then moved over central - northern part of Lao PDR and weakened into an area of low pressure on 18 August.

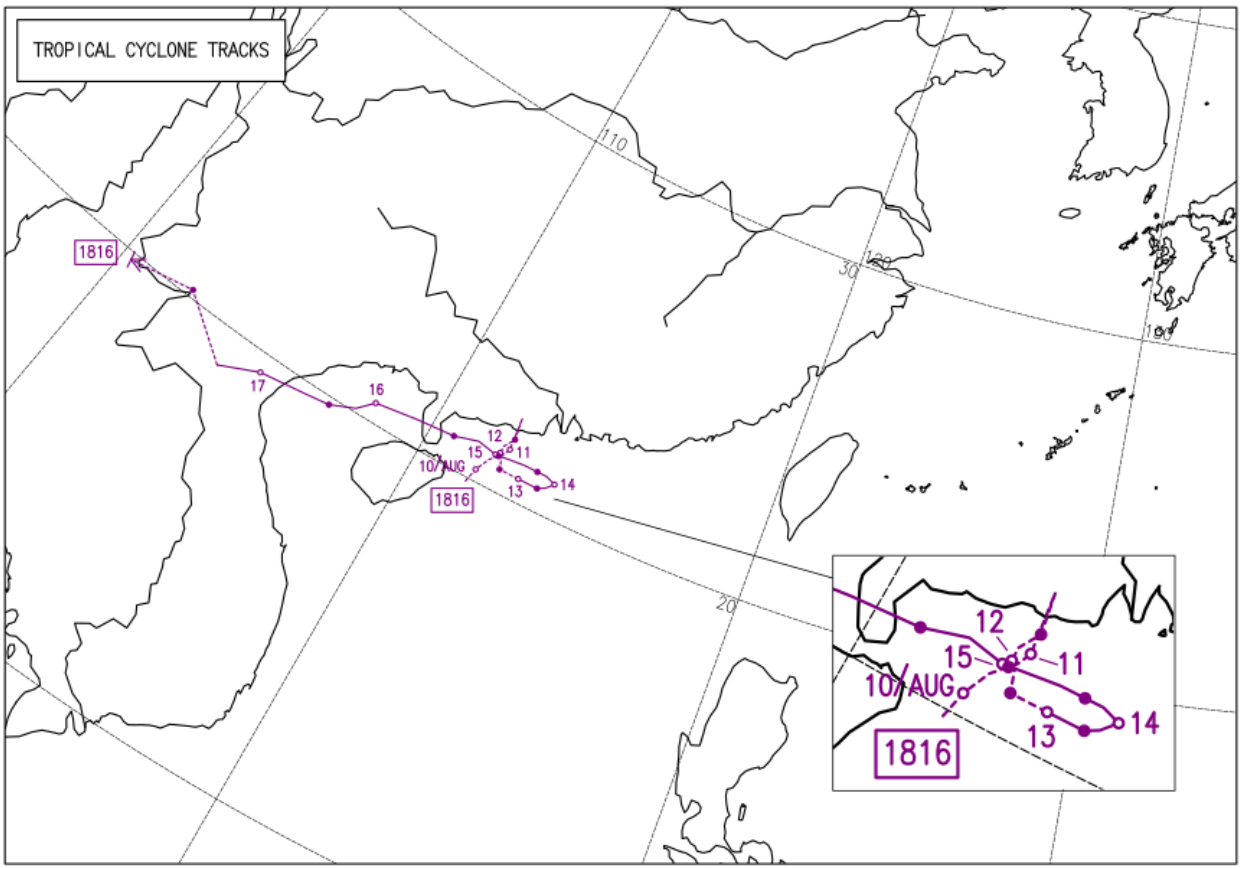


Figure 2: Best track of BEBINCA (STS1816)

During the passage of Bebinca, there was heavy rain with strong winds in Central and northern parts of Lao PDR. As a result, there were landslides, flash flood and floods in some areas.

Table 3: shown the daily rainfall amount recorded during the passage of Bebinca over Lao PDR from 15 Aug to 20 Aug 2018

Station	15 Aug	16 Aug	17 Aug	18 Aug	19 Aug	20 Aug	Total
phongsaly	1.4	13.7	1.5	4.0	NT	1.8	22.4
Viengxay	33.0	60.9	65.8	26.4	NT	0.3	186.4
Xamneua	30.5	51.3	76.9	63.2	NT	NT	221.9
Xiengkhuang	8.4	67.8	68.0	39.2	3.6	NT	187.0
Luangnamtha	NT	52.2	81.1	22.7	2.0	2.0	160.0
Muang Sing	0.0	18.7	18.2	12.5	3.4	4.6	57.4
Viengphoukha	1.1	19.4	14.5	6.6	NT	14.3	55.9
Oudomxay	NT	30.7	54.9	39.2	0.5	11.2	136.5
Bokeo	1.4	11.6	30.6	4.7	0.5	NT	48.8
Luangprabang	1.6	38.5	40.5	4.7	1.7	20.0	107.0
Xaiyabouly	NT	10.4	132.4	4.7	NT	1.7	149.2
Vientiane	NT	8.2	10.6	NT	9.0	9.0	36.8
Xaysomboun	1.0	30.5	50.5	14.5	14.4	13.1	124.0
Phonhong	NT	14.3	54.8	16.3	6.7	4.2	96.3
Paksanh	2.1	27.2	10.8	68.3	10.9	47.6	166.9

Lak 20	14.3	11.2	25.2	3.6	1.8	2.1	58.2
Viengthong	8.8	37.6	14.5	1.8	6.1	19.0	87.8
Thakhek	0.4	4.2	7.8	4.7	20.2	1.4	38.7
Savannakhet	4.2	0.6	7.8	3.0	NT	NT	15.6
Seno	NT	1.5	NT	3.3	NT	1.3	6.1
Salavanh	41.8	3.1	8.6	8.0	1.2	49.2	111.9
Pakse	16.8	NT	43.8	26.8	3.2	21.2	111.8
Paksong	110.9	31.6	38.7	29.9	9.8	21.7	242.6
Nikom 34	12.7	12.6	29.0	11.0	6.0	30.2	101.5
Sekong	24.4	0.5	2.8	12.4	NT	NT	40.1
Thateang	27.6	3.5	7.3	1.1	0.1	12.7	52.3
Dakjung	31.3	0.7	10.1	NT	NT	5.2	47.3
Attapeu	10.6	12.9	53.3	14.6	NT	11.1	102.5

- **Early Warning and dissemination system**

In 2018, DMH issued the early warning bulletins for local storms, heavy rain, strong wind, landslides, flash floods and floods. The warnings sent to the government's offices and public via telephone, fax, newspaper, TV, radio, face book and what apps which reached to people and risk areas in times.

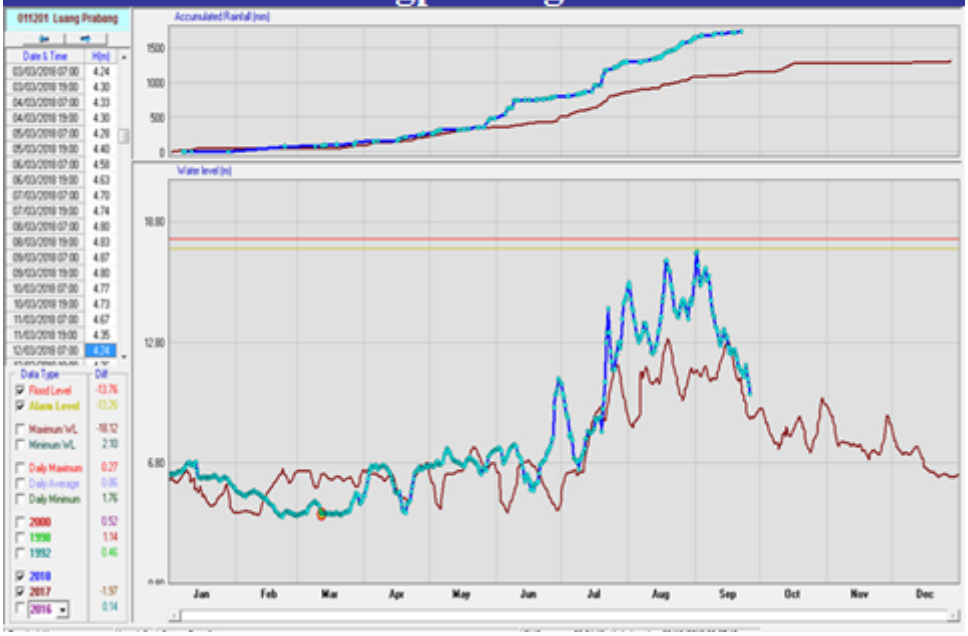
2. Hydrological Assessment (highlighting water-related issues/impact)

In this year, Lao PDR affected by local storm, heavy southwest monsoon and 2 tropical cyclones and caused the water level of the Mekong and its Tributaries in the whole country was raised rapidly and continuously from July till September. In this period, the flash flood, debris flow and land slide occurred in the mountain areas, whereas in the low land areas affected by flood inundation more than 2 weeks. The Highest water level for both Mekong River and some its Tributaries were shown in table and in graphic:

2. The peak water level in 2018

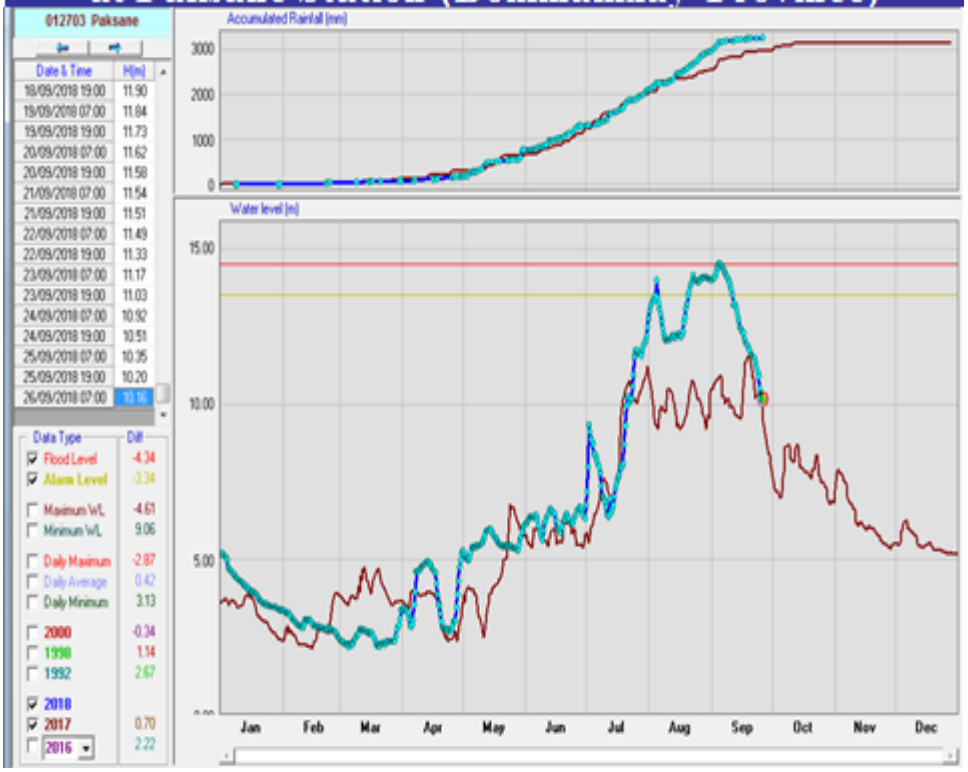
No	Name of station	Peak of water level 2018 (m)	Warning level (m)	Danger level (m)
	Mekong River			
1	Luangprabang	17.26 (01/09/2018)	17.50	18.50
2	Vientiane	11.67 (03/09/2018)	11.50	12.50
3	Paksane	14.51 (06/09/2018)	13.50	14.50
4	Thakhek	13.84 (31/08/2018)	13.00	13.50
5	Savannakhet	12.25 (08/08/2018)	12.00	13.00
6	Pakse	12.68 (31/078/2018)	11.00	12.00
	Mekong's Tributaries			
7	Nam Ngum, Pakkagnoung	12.56 (05/09/2018)	11.00	12.00
8	Nam Sane, M. Kao	8.87 (20/07/2018)	7.00	8.00
9	Sebangfai, Mahaxay	17.46 (02/08/2018)	14.00	15.00
10	Sebangfai, Khoase	21.88 (02/08/2018)	17.50	18.50
11	Sechamphone, Kengkok	8.62 (31/07/2018)	7.00	8.00
12	Nam Song, Vangvieng	3.82 (24/08/2018)	12.30	13.30
13	Sekong Attapeu	15.23 (16/08/2018)	15.00	16.00

Accumulated Rainfall and Mekong's Water Level at Luangprabang Station



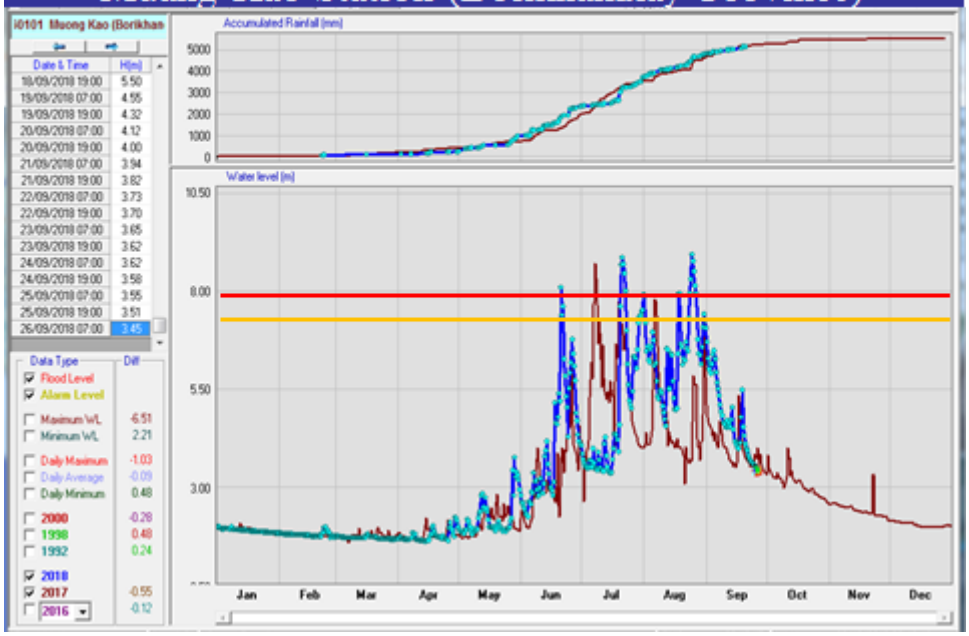
Accumulated Rainfall and Mekong's Water Level at Vientiane Capital Station

Accumulated Rainfall and Mekong's Water Level at Paksane Station (Bolikhamxay Province)

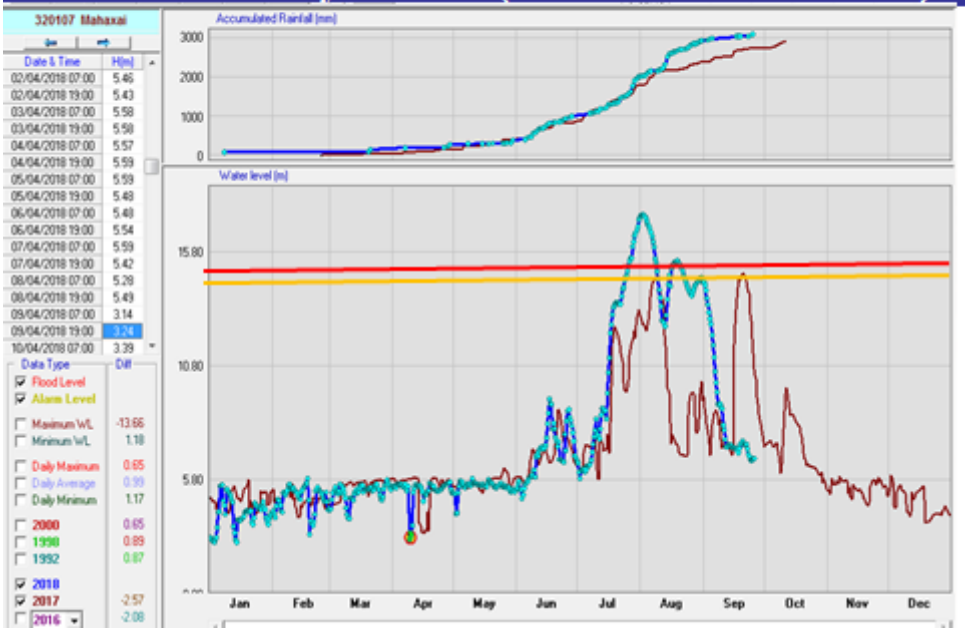


Accumulated Rainfall and Nam Ngum Water Level at Pakkagnoung Station (Vientiane Province)

Accumulated Rainfall and Nam Sane Water Level at Muang Kao Station (Bolikhamxay Province)



Accumulated Rainfall and Nam Sebangfai Water level at Mahaxay Station (Khammuane Province)



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

Started from March to June 2018, Lao people suffered from natural disasters such as local storms, lightning, heavy rain, flash flood and landslides in some areas of northern and central parts, and then from mid-June to August 2018, the active southwest monsoon and associated with two tropical cyclones passed over Central and Northern parts of Lao PDR, resulted, it enhanced the continuous rain and extreme weather over Lao PDR such as: landslides, flash flood, floods and dam break causing catastrophic damage to properties and loss of life of the people, infrastructures and socio economic, especially to roads, bridges, agricultural areas, irrigations, drinking water, schools, hospitals, electricity, buildings and other facilities over 17 provinces and one capital city of Lao PDR

3.1. Socio Economic loss by lightning

From 21 – 22 Feb 2018, lightning strike killed 27 cows in Kenethao District of Xayabouly Province, and 1 person die in Nonghet District of Xienkhuang Province.

Lightning on 21 Feb 2018 at Kenethao District, Xaiyabouly Province

3.2. Socio Economic loss by local storm

From 21 - 22 Feb 2018, local storm occurred in northern and central parts of Lao PDR, causing the strong wind and many houses damages , trees and electricity poles broken down.

22 Feb 18, Luangprabang Province

21 Feb 18, Vientiane Capital

3.3. Socio Economic loss by hail storm

On 21 Feb 2018, severe hail storm occurred in Xiengkhuang and Vientiane Provinces and affected many houses. On 4 April 2018, hail storm occurred in Oudomxay Province and affected to agricultural products.

21 Feb 18, hail storm in Xiengkhuang and Vientiane Province


4 April 18, severe hail storm in Oudomxay Province

3.4. Socio Economic loss by flash floods

Flash flood occurred every year during southwest monsoon, especially in northern and central parts and also some mountainous areas in southern part. In 2018, there were many areas had heavy rain and the rain continuously caused flash floods caused houses washed away, road cut off, agricultures affected.


3.5. Socio Economic loss by landslides

During June to August 2018, strong southwest monsoon and associated with two tropical cyclones passed over central and northern parts of Lao PDR, resulted widespread moderate to heavy rain from north to south causing landslides in some areas of northern and central parts and some mountainous areas of southern part which affected to properties and loss of life of the people.



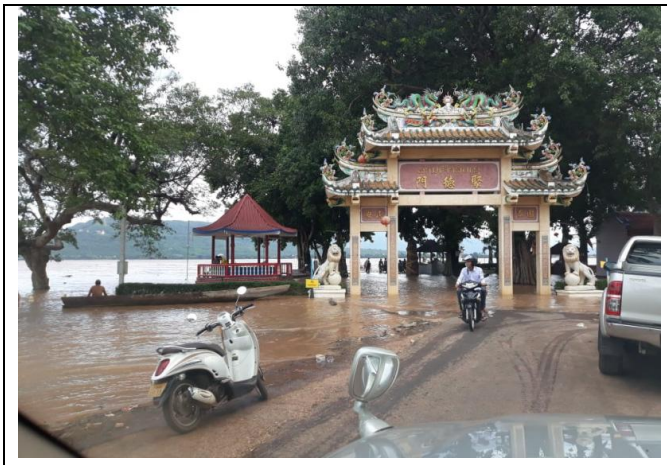





3.6. Socio Economic loss by floods

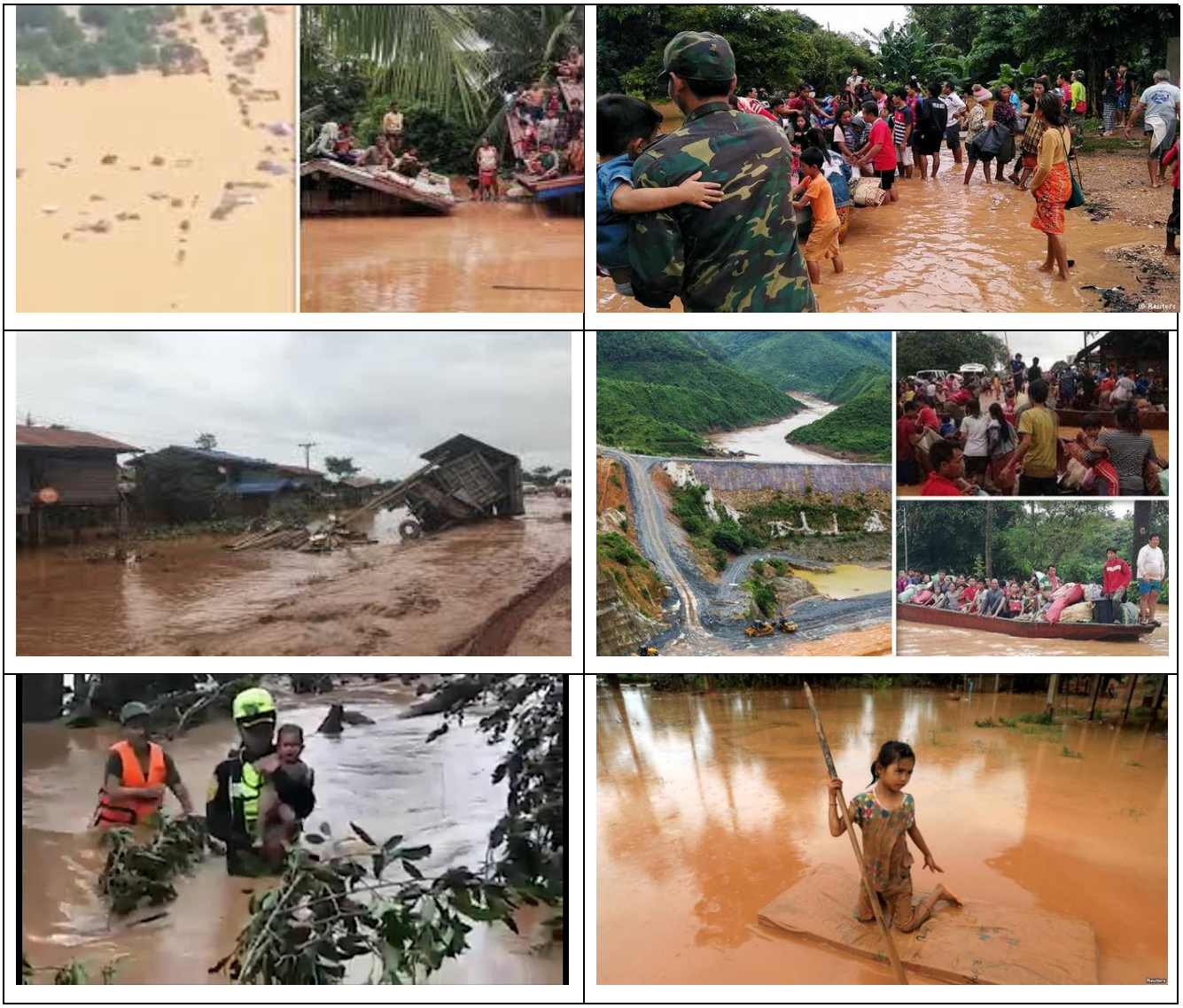
On 18 and 19 July, Tropical Storm Son-Tinh caused heavy rains and flooding in 55 districts of 13 provinces across Lao PDR. According to the Government, over 24,000 families are affected by these floods thus far. With the water levels in the Mekong River and its tributaries due to rise over the coming weeks, the situation is likely to deteriorate and flooding may spread farther.

Following Son Tinh was the Tropical Storm Bebinca which hit the country only weeks after. According to latest Government reports, all provinces in Lao PDR have been affected, including an estimated 116 districts, 2,400 villages and 132,000 households. According to the UN Information Bulletin No.2, around 17,000 people are currently evacuated from their villages, and 1,772 houses have been destroyed. Approximately 150 km of national and provincial roads, as well as 133 km of district and 350 km of rural roads and 47 bridges have been damaged. Moreover, around 100,000 hectares of paddy field have been damaged, and a large number of livestock has been lost, including 17,000 large animals and 79,000 poultry. Irrigation systems have been heavily damaged. The most affected provinces are Attapeu, Khammouane, Savannakhet, Champasak and Oudomxay. As the floods have increasingly affected also other parts of the country.

3.7. Socio Economic loss by the collapse of the Xe-Pian Xe-Namnoy dam

The collapse of the Xe-Pian Xe-Namnoy dam on 23 July 2018 as a result of Tropical Storm Son Tinh that had made land fall days earlier, has caused massive flash floods that affected 13,100 people and displaced 6,000 people, leaving 39 dead and around 97 missing (according to UN Situation Report no. 9).



3.8. Summaries the impacts from natural disaster in Lao PDR for 2018

Table 4 shown the summaries of disaster in Lao PDR in 2018

N#	Province	District	Village	Household	People	Female	Missing	Death
1	Oudomxay	7	239	11,645	68,456	33,762	-	-
2	Xiengkhuang	7	27	508	3,162	1,549	-	4
3	Savannakhet	15	411	37,714	191,677	12,372	-	-
4	Khammouane	10	435	32,004	132,432	68,883	-	-
5	Bokeo	5	36	698	1,486	744	-	-
6	Huaphanh	4	58	1,101	3,936	577	-	-
7	Attapeu	3	26	4,081	20,267	3,592	32	40
8	Bolikhamxay	6	193	8,228	41,396	20,088	-	1
9	Luangprabang	11	95	1,185	5,734	2,795	3	10

10	Xaiyabouly	8	40	1,056	5,422	2,633	-	-
11	Sekong	4	80	5,517	31,406	5,974	-	-
12	Phongsaly	6	37	365	1,435	704	-	-
13	Champasack	10	336	15,069	87,238	77,016	-	-
14	Luangnamtha	4	62	721	929	346	-	-
15	Vientiane Cap	6	128	7,595	37,009	17,626	-	-
16	Xaysomboun	1	82	-	-	-	-	-
17	Vientiane Pro	5	51	3,773	15,338	166	-	-
18	Salavanh	4	98	1,147	-	-	-	-
	Total	116	2,434	132,407	647,323	248,827	35	55

3.9. Disaster response

In addition to seasonal flooding, an unprecedented flash flood occurred on 23 July in Attapeu Province due to water discharge from the Xepien-Xe Nam Noy Dam. Over five billion cubic meters of water, equal to two million Olympic swimming pools, inundated an estimated 55,000 hectares of land covering it with mud and sludge. Initial air and ground assessment results led the Prime Minister of Lao PDR to declare the affected areas as a National Emergency Disaster Zone. The Government is leading the response through the National Disaster Prevention and Control Committee, chaired by the Deputy Prime Minister, and welcomed international support on 25 July. Development partners and members of the Humanitarian Country Team are augmenting national response efforts.

Disaster response from Government

Disaster response from line agencies and development partner

ການຕອບໂຕ້ຂອງບັນດາຂະແໜງການ ແລະ ຄູ່ຮ່ວມງານ

- ຂະແໜງ ຮສສ (ສູນພັກເຊົາ ຊົ່ວຄາວ, ຈັດການສາງເຄື່ອງ, ເກັບກູ້ລະເບີດ)

- ປ້ອງກັນປະເທດ(ຊອກຫາ-ກູ້ໄພ, ຂົນສົ່ງສຸກເສີນ, ແຮງງານຊ່ວຍຍົກຍ້າຍເຄື່ອງ)

- ສາທາລະນະສຸກ ແລະ ອົງການຫມາແດງ (ສຸຂະອານາໄມ, ນ້ຳສະອາດ, ສຸຂະພາບ

- ສຶກສາທິການ (ມຸມທີ່ເປັນມິດຕໍ່ເດັກ, ອຸປະກອນການສຶກສາ)

4. Regional Cooperation Assessment (highlighting regional cooperation success and challenges.

The Department of Meteorology and Hydrology of Lao PDR has collaborated with International Organizations and donors to improve the hydrological and meteorological services in Lao PDR such as:

- By collaboration with Mekong River Commission (MRC) to upgrade the hydrological networks along the Mekong River as well as its tributaries, and also to share the water level and flood forecasts among the MRC member countries.
- With JICA: 18 meteorological stations has been upgraded to Automatic Weather Stations, 8 hydrological stations upgraded to Automatic Water Level Stations, and well as facilities for weather monitoring and forecasting have been upgraded.
- Under support from World Bank to upgrading hydro-meteorological networks stations over the country and construct national early warning center, and providing the facilities for national early warning center.
- Under support from Asian Development Bank to upgrade the hydro-meteorological networks over central part.
- Under support from Food and Agriculture Organization (FAO) to establish the 15 agro-meteorological stations.
- Under Typhoon Committee frameworks, National Disaster Management Institute (NDMI) support for establish Flash Flood Alert System in Lao PDR.
- With support from World Bank to Strengthen Resilience to Natural Disaster (DRM project)
- With support from CMA, DMH has completed to set up the weather TV's studio
- Under supporting from Chinses Government to establish the water resources center which located in DMH's headquarter.

II. Summary of Progress in Priorities supporting Key Result Areas

1. Establishment of Flash Flood Alert System in Lao PDR

Main text:

NDMI of Republic of Korea and DMH of Lao PDR have signed the agreement to install the Flash Flood Alert System in Lao PDR. Main purpose of this project is to build resilience and strengthen the capacity on disaster risk reduction in Lao PDR. In this project, NDMI and DMH cooperate to install: the Automatic Rainfall Warning System (ARWS) and Flash Flood Alert System (FFAS) in Lao PDR. In the Year 2016, the installation completed in one district namely Vang Vieng District of Vientiane Province, and for the year 2017 completed installation system in Muang Houn of Oudomxay Province. And in 2018, completed installation system in Muang Xay, Oudomxay Province.

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

NDMI will expend the project to another province for 2019.

Priority Areas Addressed:

- ✓ 4 automatic water level stations installed in Muang Xay (Xay District) in three rivers
- ✓ 4 automatic rain gauges installed in Muang Xay (Xay District) in three rivers
- ✓ 4 warning posts installed Muang Xay (Xay District)
- ✓ Sever and Internet install in Hydromet's office in Muang Xay (Xay District)

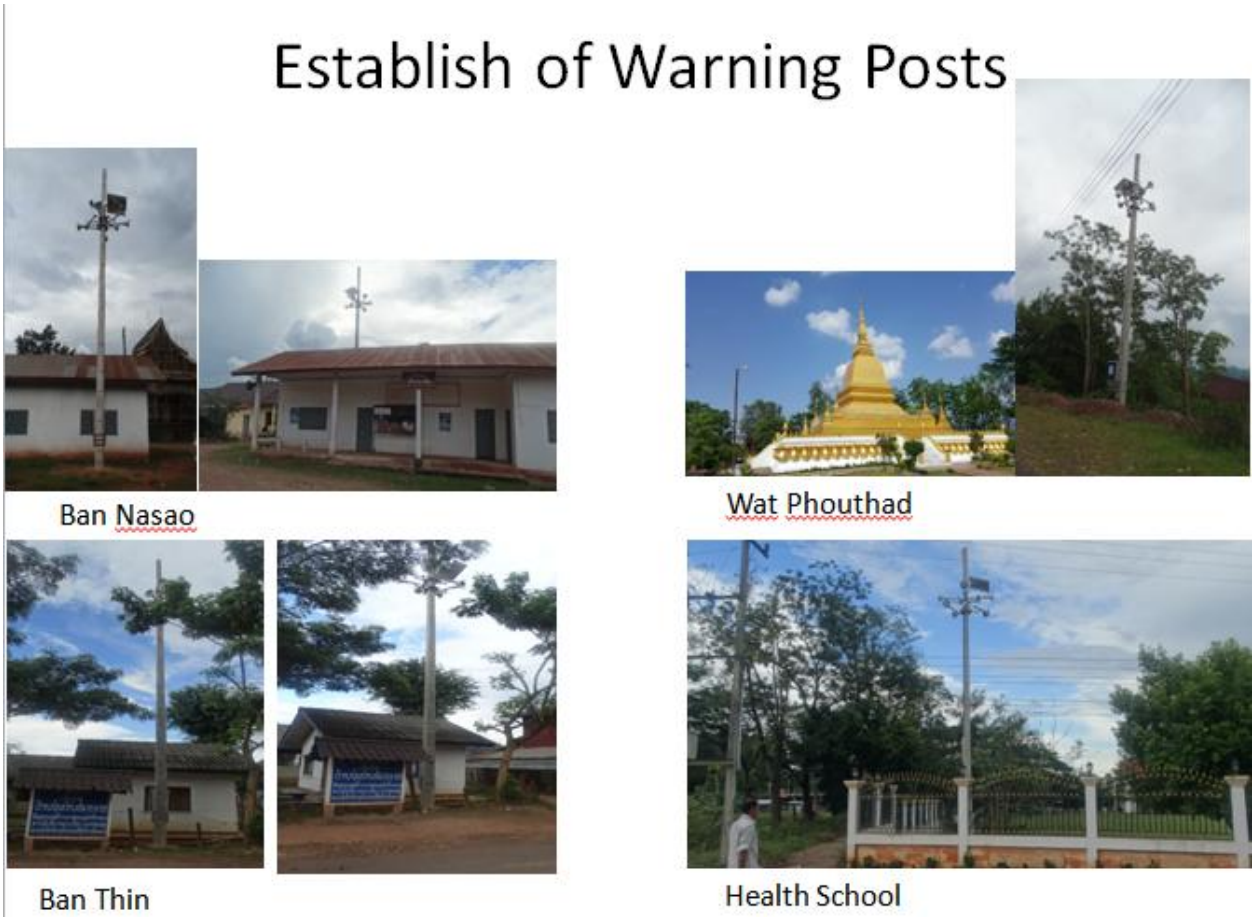
Establish of Water Level and Rain gauge

Ban Namonh, Nam Mao bridge 2

Ban Kor Noy, Nam Kor bridge 1

Ban Senekham, Nam Hin bridge

Nam Kor bridge 2



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1. [Activity or title of project (in bold lettering)]

Main text:

[Main text including description of event]

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

[Describe opportunities and challenges]

Priority Areas Addressed:

[For this section please refer to the list of priorities as listed in the KRAs Table of the TC Strategic Plan 2017-2021. Please list no more than 5 priorities]

Contact Information:

Member: [Member]
Name of contact for this item: [Point of Contact]
Telephone: [Telephone Number]
Email: [Email Address]

2. [Add as many sections as you need]

EXAMPLE

1. Tropical Cyclone Best-Track Announcement in 2015.

Main Text:
KMA made an official announcement about the production of best-track data on the twenty-seven typhoons formed in the Northwest Pacific Ocean in 2015. KMA had independently developed the post-analysis system [Fig.2-2] and announced the best-track data on eight TCs which affected the Korean Peninsula in 2014 to 2015 on a trial basis [Fig.2-3]. Data shows errors in real-time analysis and the characteristics of climatological change of typhoons using post-analysis data on typhoon location, intensity, and size after the typhoon's dissipation and is of great value for the objective verification with numerical model results. TC best-track data can also be utilized as criteria for

typhoon preparedness. Besides, analysis techniques accumulated through the process of data production is expected to significantly improve the typhoon forecast.

Identified opportunities/challenges, if any, for further development or collaboration:
We intend to progressively produce Best-track data of recorded typhoons in the Northwest Pacific.

Priority Areas Addressed:
Enhance the capacity to monitor and forecast typhoon activities particularly in genesis intensity, and structure change.

Develop and enhance typhoon analysis and forecast technique from short to long term.

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