

The 2th Regional Workshop on Impact – Based
Forecast in Asia (RA II)
19-21 November 2018 Seoul, Republic of Korea

The status of impact – based forecast implementation
and technology utilization in Lao PDR

Prepared by: Ms. Akhom THAMALANGSY
Department of Meteorology and Hydrology
Ministry of Natural and Environment

CONTENTS

- I. Overview of TC which have effected Lao PDR in territory in 2018
- II. Socio-Economic Assessment in 2018
- III. Summary of progress

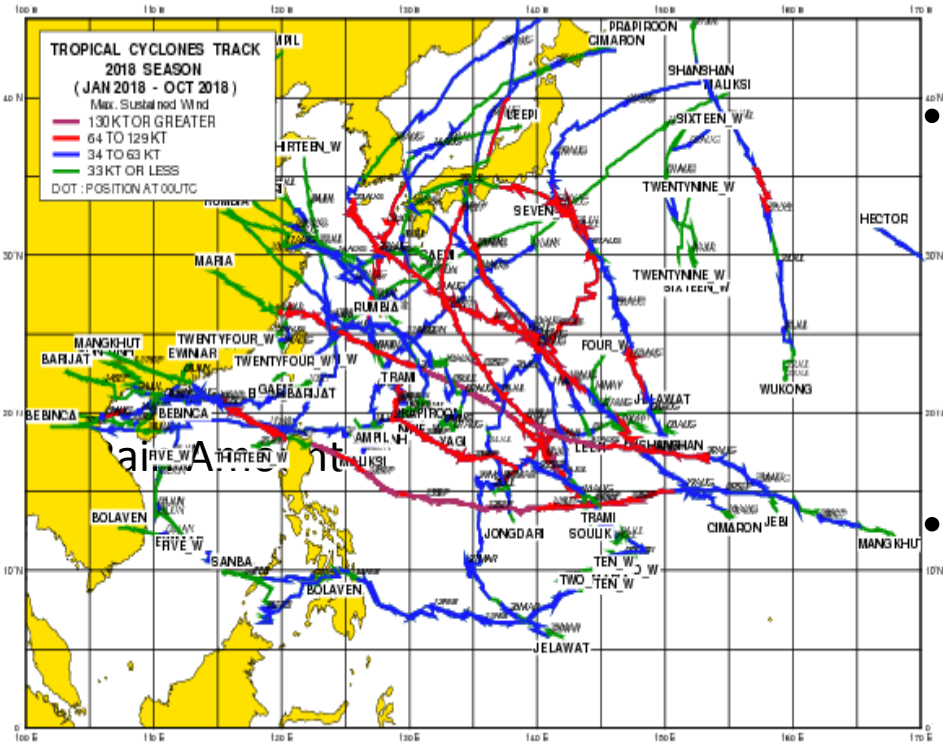
Weather condition in Laos 2018

- 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.
- In year 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.

The Weather condition in Laos 2018 (con't)

- 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 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.

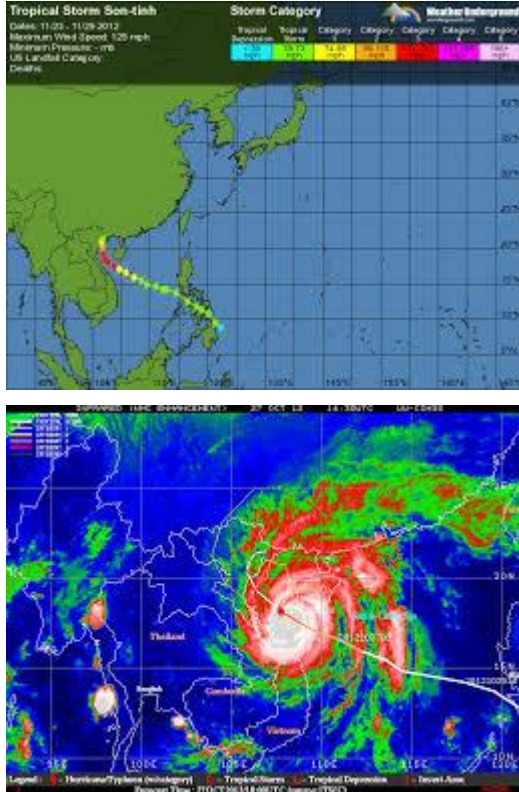
Weather condition in Laos 2018



Tropical Cyclones Track for 2018 over Western North Pacific

- 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.
- In year 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.

Tropical cyclone Son-Tinh (TS1809)



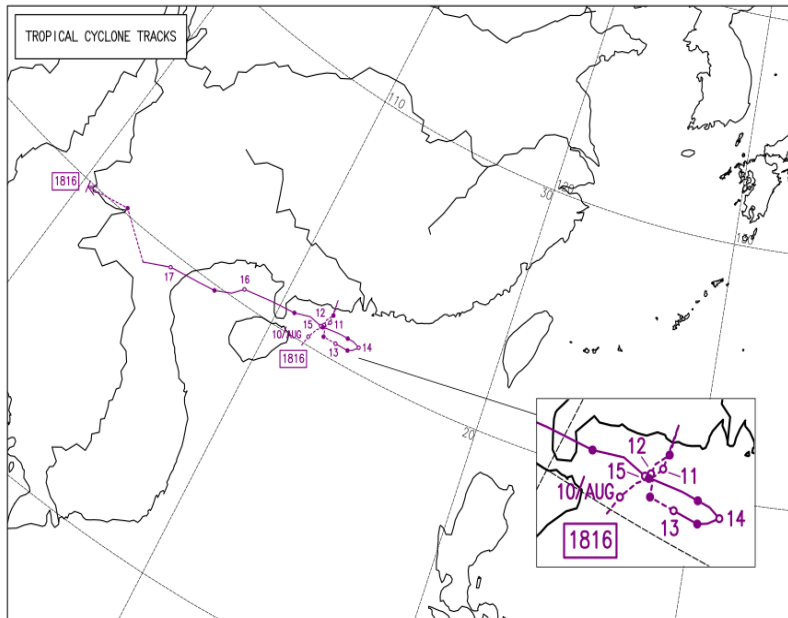
Tropical cyclone Son-Tinh best tracks

- - TS 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

Daily rainfall (mm) during the passage of TS Son-Tinh

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 Bebinca (STS1816)



Best Track of STS Bebinca (STS1816)

- TC Bebinca was the second tropical cyclone passed over Lao PDR and it was tropical cyclone number 16 over the western North Pacific Ocean in 2018.

- 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.

Daily rainfall (mm) during the passage of Bebinca (STS1816)

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

Socio-Economic Assessment in 2018



Lightning on 21 Feb 2018 at Kenethao District, Xaiyabouly Province



22 Feb 18, Luangprabang Province



21 Feb 18, Vientiane Capital

- 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

Socio-Economic Assessment in 2018



21 Feb 18, hail storm in Xiengkhuang and Vientiane Province

On 21 Feb 2018, severe hail storm occurred in Xiengkhuang and Vientiane Provinces and affected many houses.



4 April 18, severe hail storm in Oudomxay Province

on 4 April 2018, hail storm occurred in Oudomxay Province and affected to agricultural products.

Socio-Economic Assessment in 2018



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 heavy rain and the rain continuously caused flash floods caused houses washed away, road cut off, agricultures affected.

Socio-Economic Assessment in 2018



- 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.

Socio-Economic Assessment in 2018



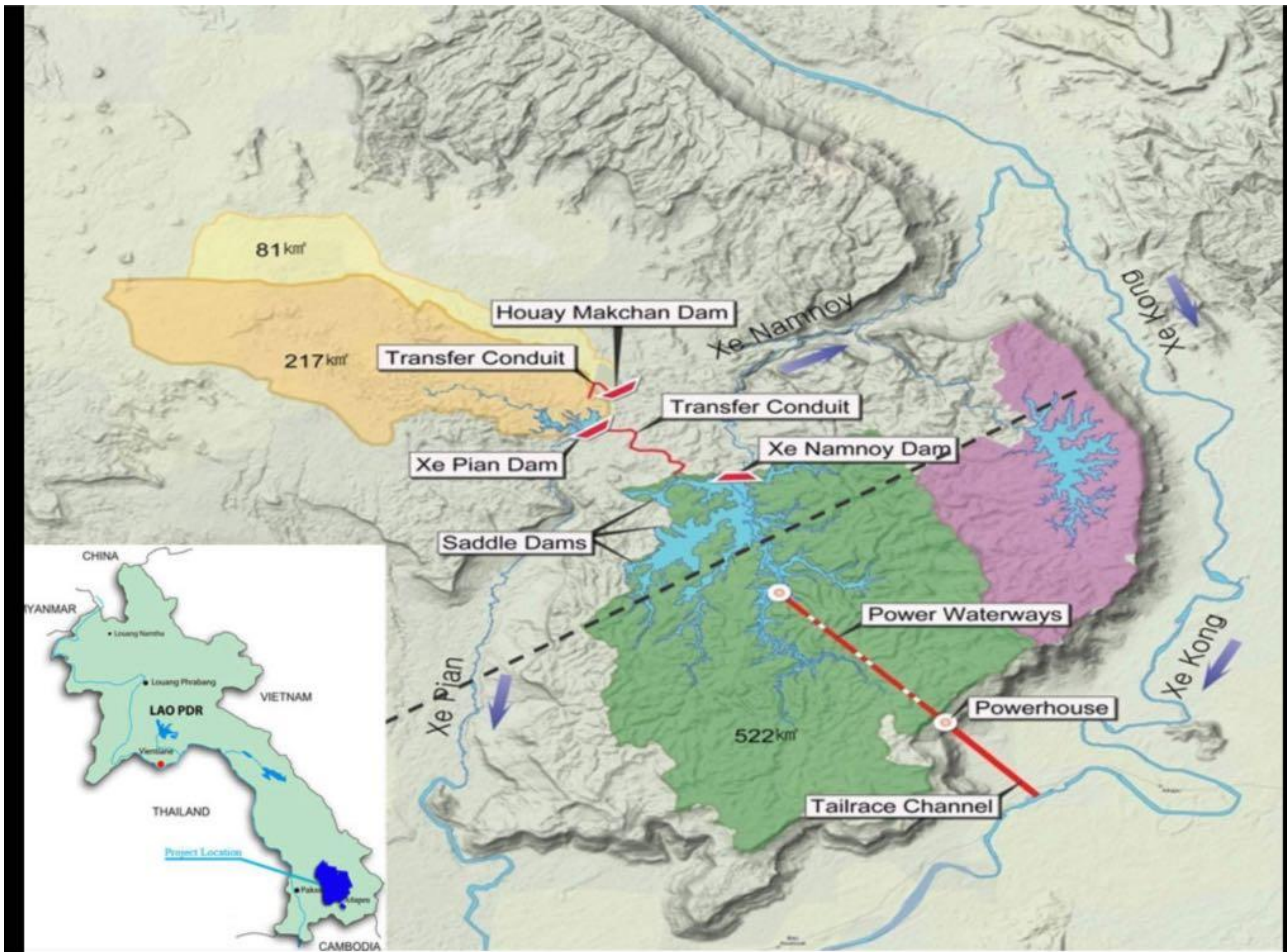
- heavy rains and flooding in 55 districts of 13 provinces across Lao PDR. According to the Government, over 24,000 families are affected by these floods thus far. With On 18 and 19 July, Tropical Storm Son-Tinh caused the water levels in the Mekong River and its tributaries due to rise over the coming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

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).

The Xe-Pian Xe-Namnoy dam



Early Warning and Dissemination



- In Year 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.

Early warning system



ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ
ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ກະຊວງອຸປະພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ
ກົມອຸດຸນິຍົມ ແລະ ອຸທິກກະສາດ

ເລກທີ 1011 /ກອດທ
ນະຄອນຫຼວງວຽງຈັນ, ວັນທີ 12 ກັນຍາ 2018

ແຈ້ງເຕືອນ ພາບຖານເຂດຮ້ອນ ບາລີແຈັດ (Barijat)



ອ້ອງຄວາມກົດດັນອາກາດຕໍ່ບັງເກີນຕໍ່ພາດວ່ານ
ຢູ່ທີ່ວຽກພາກຂອງປະເທດລາວດ້ວຍກຳລັງອ່ອນ
ບ່ອນຂີ່ຊູ່ ມີມາບຸກຮຸນເຂດຮ້ອນ ບາລີແຈັດ
(Barijat) ທີ່ວິທີ 23 ໃນເວລາ 10 ໂມງເຊົ້າຂອງ
ວັນທີ 12 ກັນຍາ 2018 ມີຈຸດທີ່ຕັ້ງຢູ່ເຂດທະເລຈີນ
ໃຕ້ຕອນເໜືອ ຢູ່ເສັ້ນຂະໜານທີ 20.7 ອົງສາເໜືອ
ແລະ ເສັ້ນແວງທີ 114.8 ອົງສາຕາເວັນອອກ ກຳລັງ
ເຄື່ອນທີ່ໄປທາງທິດຕາເວັນຕົກ ດ້ວຍຄວາມໄວ 15
ກິໂລແມັດຕໍ່ຊົ່ວໂມງ. ພ້ອມດຽວກັນກະແສລົມ
ຕາເວັນຕົກ-ຕາເວັນຕົກສ່ຽງໃຕ້ພັດປົກຄຸມເປັນ
ສ່ວນໃຫຍ່. ຄາດວ່າໃນໄລຍະວັນທີ 14 - 15 ກັນຍາ
2018 ພາບຖານນີ້ຈະເຄື່ອນທີ່ບໍ່ມາເໜືອຂອງ
ປະເທດ ສສ ຫວຽດນາມ, ຊຶ່ງຈະເຮັດໃຫ້ມີມົນຕົກ
ພ້ອມ ພົ້ນເຫຼື້ອມ ໃນລະດັບຕ່ຳອ່ອນ ຫາ ປານກາງ
ບາງທ້ອງຖິ່ນໃນແຕ່ລະພາກຂອງປະເທດລາວ. ຈາກນັ້ນ ວັນທີ 17 - 18 ກັນຍາ 2018 ຈະເຮັດໃຫ້ມີມົນຕົກໃນ
ລະດັບຕ່ຳອ່ອນ ພ້ອມມີລຶບໄຮມຢູ່ເກືອບທົ່ວໄປ ແລະ ຕົກປານກາງ ຫາ ຕົກໜັກຢູ່ບາງທ້ອງຖິ່ນ ແຂວງ ພາກເໜືອ
ແລະ ພາກກາງ ຂອງປະເທດລາວ ເຊັ່ນ: ແຂວງ ຕື້ງສາລີ, ຫຼວງນໍ້າທາ, ບໍ່ແກ້ວ, ອຸດົມໄຊ, ຫົວພັນ, ຫຼວງພະບາງ, ຊຽງ
ຂວາງ, ໄຊສົມບູນ, ໄຊຍະບູລີ, ວຽງຈັນ, ບໍລິຄໍາໄຊ ແລະ ຄຳມ່ວນ, ນັບທັງນະຄອນຫຼວງວຽງຈັນ.

ດັ່ງນັ້ນ, ຈຶ່ງແຈ້ງເຕືອນ ເຖິງພໍ່ແມ່ປະຊາຊົນບັນດາເຜົ່າ, ອຳນາດການປົກຄອງ ແລະ ອົງການຈັດຕັ້ງທຸກ
ພາກສ່ວນທີ່ອາໄສຢູ່ບັນດາເຂດແຂວງກ່າວ ຈຶ່ງມີສະຕິ ແລະ ກວມພ້ອມອົບມີກັບສະພາບຝົນຕົກໜັກ, ຈຶ່ງຈະເຮັດ
ໃຫ້ມີຕົ້ນໄມ້ຫັກລົ້ມ, ຕົ້ນເຈືອນ, ນໍ້າຖ້ວມອົງ ແລະ ລົມສົດແຮງ ພ້ອມນີ້ຂໍໃຫ້ເກັບມ້ຽນ ແລະ ເຄື່ອນ
ຍ້າຍວັດຖຸສິ່ງອາໄສອາໄສສິດສິ່ງປ່ຽນແປງທີ່ສູງ ແລະ ປອດໄພ. ຂໍໃຫ້ຕິດຕາມຂ່າວພະຍາກອນອາກາດ ແລະ
ລະດັບນໍ້າ ຈາກກົມອຸດຸນິຍົມ ແລະ ອຸທິກກະສາດ ເປັນປະຈຳ.



ນິຄົມ ແກ້ວສະຫວ່າງ

Regional Cooperation 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.

Regional Cooperation and challenges (con't)

- 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.

Regional Cooperation and challenges (con't)

- Participated WGM meeting 9-10 May 2018 in Siang Hai, China
- Training course on TOS from 8-10 Oct.18 at DMH Headquarter transferred by expert of KMA
- Participated Regional Radar Network Southeast Asia 22-26 October 2018 in JMA Tokyo
- The problem number of Doppler radar only one for whole country and rainy season was broken from July 2017 up to now.
- The problem lack of budget

Establishment of Flash Flood Alert System in Lao PDR

- 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.

Establishment of Flash Flood Alert System in Lao PDR(con't)

- NDMI will expend the project to another province for 2019.
- 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

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

Establish of warning posts

Establish of Warning Posts



Ban Nasao



Wat Phouthad



Ban Thin



Health School

Thank you very much!