MEMBER REPORT
Lao PDR

ESCAP/WMO Typhoon Committee
12th Integrated Workshop
Jeju, Republic of Korea
30 October – 3 November 2017

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)

There were 4 Tropical Cyclones affected Lao PDR from 1st January to 31st October 2017 (Tracks as shown in figure 1) which are above normal data passing Lao PDR (normal 2 – 3 tropcal cyclones). These tropical cyclones were classified into 3 categories which impacted directly over Lao PDR, namely: Severe Tropical Storm Talas (1704), Tropical Storm Sonca (1708), Typhoon Doksuri (1719), and Tropical Depression.

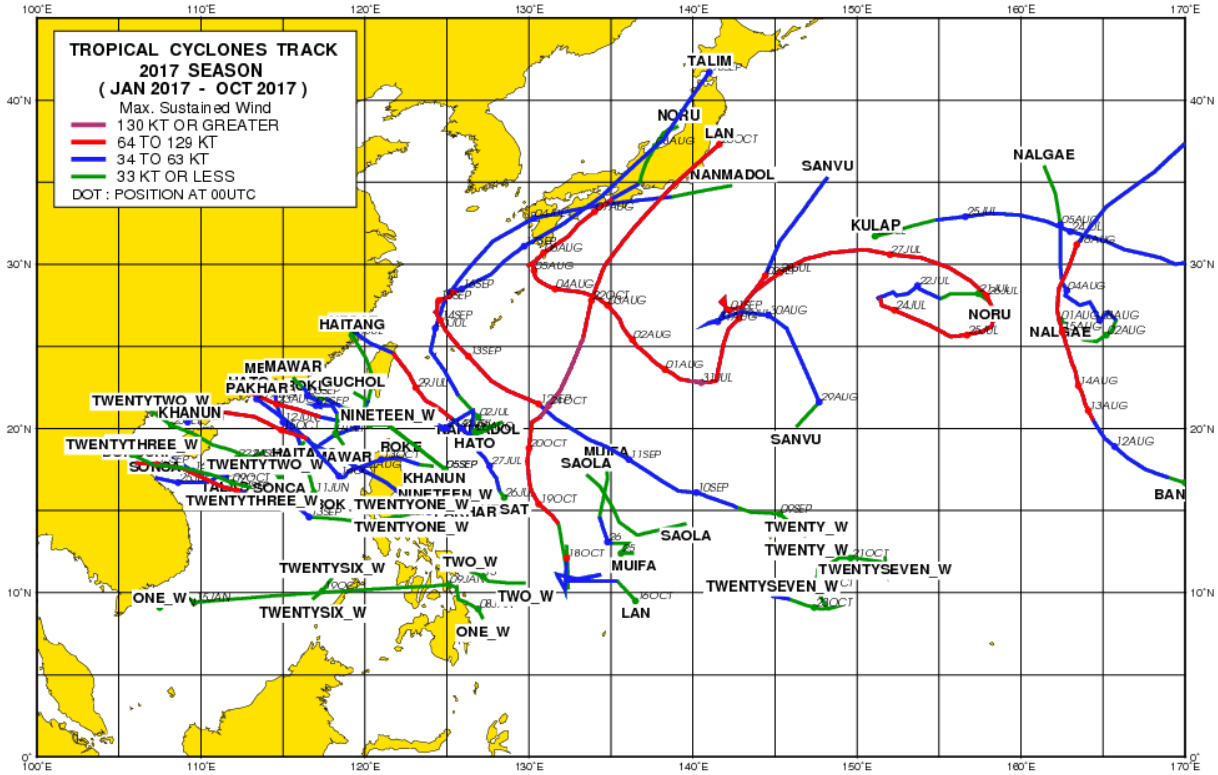
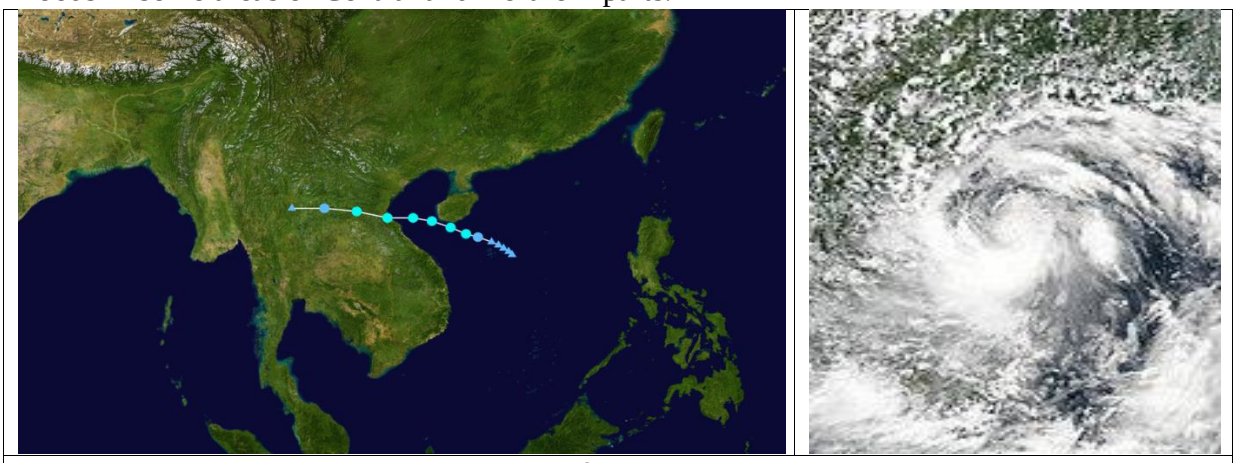


Figure 1: Tropical Cyclones Track for 2017 over Western North Pacific

(1) **Severe Tropical Storm Talas (1704):** Talas was the first tropical cyclones of the year 2017 passed over Lao PDR and it was number 4 of the year 2017 over Western North Pacific Ocean. Talas was formed to a tropical disturbance over South China Sea during 13 July 2017. The next day around 6:00 UTC, it developed as a weak tropical depression and started to move slowly towards the northwest. Several hours later, it intensified into Tropical Storm on 15 July. On 9:00 UTC of 16 July 2017, Talas increased intensity into Severe Tropical Storm and around 18:00 UTC the same day, Talas made landfall in Central Vietnam near the city of Vinh and continued passed over Xienkhang, Xaysomboun and Bolikhamxay Procinces of Lao PDR on early morning of 17 July 2017. Talas was downgraded to Tropcal Depression passed over northwestern part of Lao PDR during 17 to 18 of July then entered to Thailand. During the passage of Talas, there were heavy rain and associated with strong wind

over central and norther parts of Lao PDR. As a result, there were landslides, flash flood and floods in some areas of Central and Northern parts.

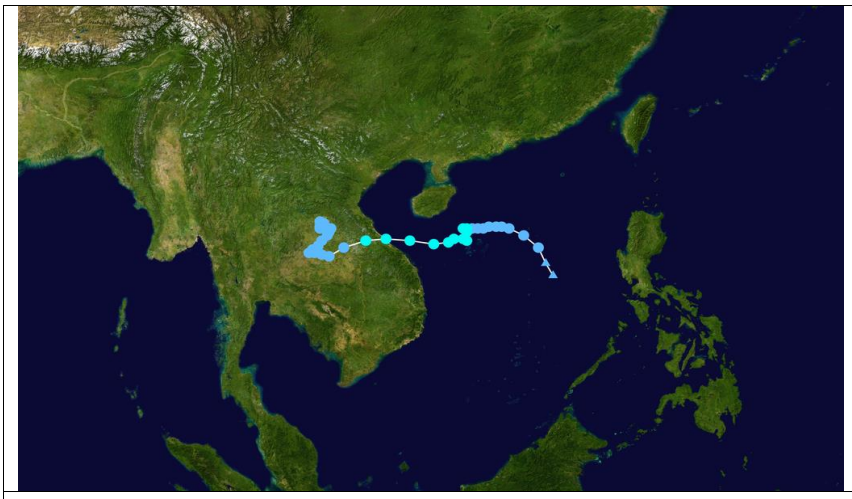


Best Track of STS Talas (1704)

Table 1 : Daily rainfall (mm) during the passage of Talas

District/Province	15/07/2017	16/07/2017	17/07/2017	18/07/2017
Bokeo	5.9	4.0	25.6	13.9
Luangprabang	6.2	2.9	38.6	5.2
Xaiyabouly	33.5	14.2	67.8	0.0
Xiengkhuang	35.5	32.5	18.1	79.2
Xaysomboun	18.6	12.2	85.5	26.6
Phonhong	9.0	14.7	70.5	0.0
Paksanh	4.2	33.0	77.6	15.9
Lak 20	6.6	148.9	39.2	4.3
Thakhek	52.4	79.9	15.5	18.5

(2) **Tropical Storm Sonca (1708):** Sonca was the second Tropical Cyclone of the year 2017 passed directly over Central part of Lao PDR on 25 July 2017 and it was number 8 of the year over Western North Pacific Ocean. Sonca was formed as Tropical Depression on 21 July 2017 over South China Sea and it intensified to Tropical Storm on 23 July then made landfall in Central of Vietnam through city of Vinh in the evening of 25 July, then passed over Khammoune and Savannakhet Provinces of Lao PDR on 26 July 2017 after that it downgraded to Tropical Depression passed over the Northeastern part of Thailand. During the passages of Sonca, heavy rainfall with strong wind were recorded over the central and southern parts. As a result, landslides, flash floods and floods were occurred in some provinces of Lao PDR.

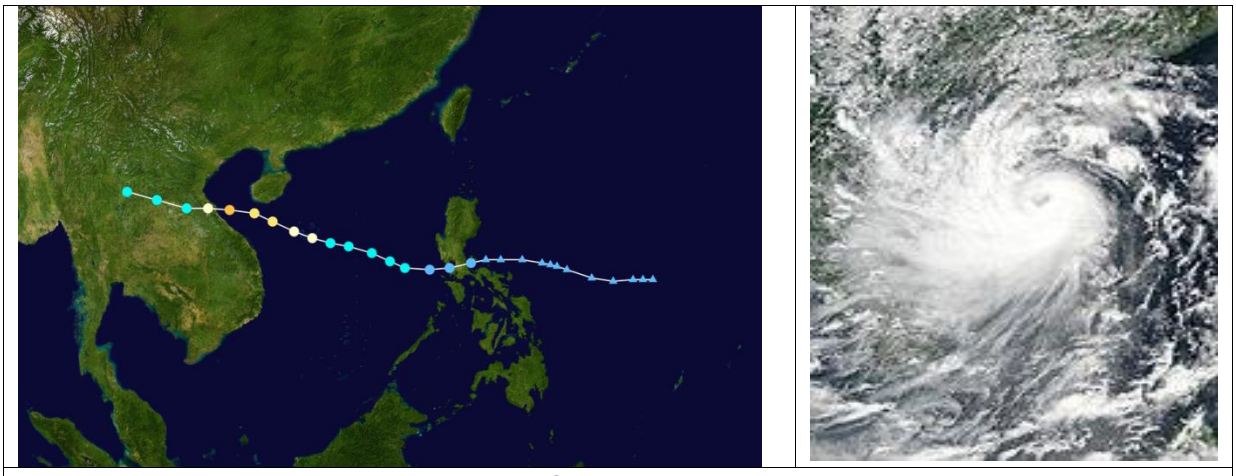


Best Track of TS SONCA (1708)

Table 2 : Daily rainfall (mm) during the passage of SONCA

District/Province	23/07/2017	24/07/2017	25/07/2017	26/07/2017
Thakhek	1.5	0.3	22.1	3.8
Savannakhet	0.0	48.5	78.4	77.5
Seno	2.8	18.4	46.6	33.7
Salavanh	11.8	29.7	130.0	43.2
Sekong	6.2	34.1	14.4	31.2
Thateang	3.2	62.5	104.5	28.8
Pakse	3.8	105.9	134.8	47.4
Paksong	16.5	90.4	173.3	31.0
Nikhom 34	2.3	23.9	123.1	42.9
Attapeu	0.0	63.3	85.3	36.7

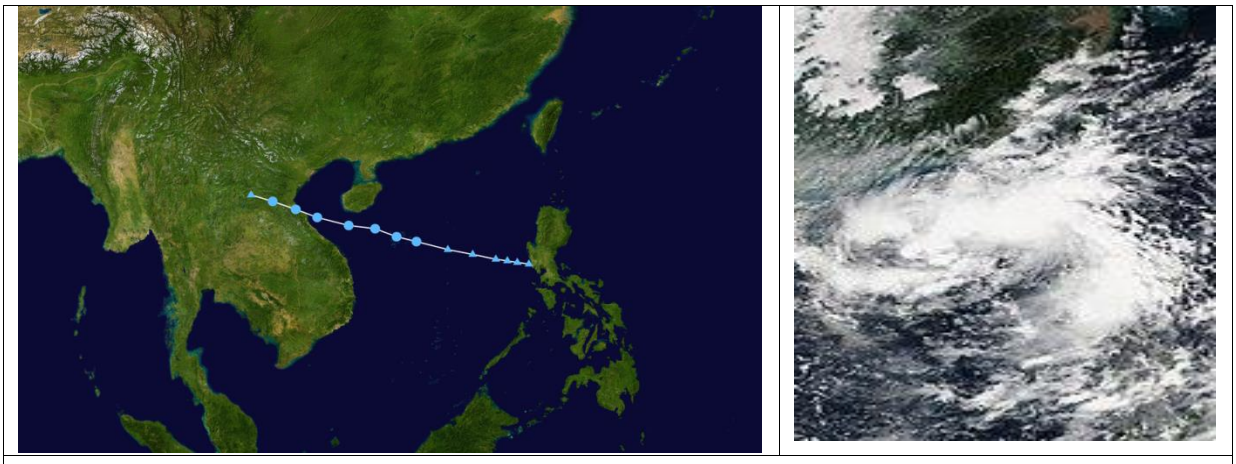
(3) **Typhoon Doksuri (1719):** Doksuri was the third Tropical Cyclone of the year 2017 passed directly over Central part of Lao PDR on 16 September 2017 and it was number 19 of the year over Western North Pacific Ocean. Doksuri formed as weak Tropical Depression near eastern part of Philippines on 10th September 2017 and moved acrossed northern part of Philippines on 11 September. It intensified into the Tropical Storm passed over South China Sea on 12th September. Doksuri upgraded into Typhoon in the evening of 14 September then made landfall over city of Vinh, Vietnam on 15 September then moved over central part of Lao PDR after that weakening into Tropical Storm before entering to Thailand. During the passages of Typhoon Doksuri, heavy rain and associated with strong were observed during 15 – 18 September, resulted, landslides, flash flood and flood over northern and central parts of Lao PDR.



Best Track of TY DOKSURI (1719)

(4) **Tropical Depression 23W**

Early on October 7, a tropical depression 23W formed to the west of the Philippines and moved northwestward over South China Sea, on 10 October 2017, Tropical Depression made landfall in Hà Tĩnh Province, Vietnam and then continued moving through central part of Lao PDR on 11 October 2017. Tropical Depression 23W caused landslides, flash flood and flood in some areas of central and northwestern parts of Lao PDR.



Best Track of Tropical Depression

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

Of the 4 tropical cyclones that impacted Lao PDR, there are 2 tropical cyclones caused severe damages to properties and life of the people, such as: on agriculture and transportation sectors due to landslides, flash flood and floods. During the tropical cyclones events over Lao PDR, the Mekong River and its tributaries went up quickly and associated the released water from the dams in Lao PDR and Thailand, resulted, Mekong River reached to danger level as well as its tributaries. As a result, severe flood occurred in central and southern parts of Lao PDR and prolonged more than two weeks.

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

In March 2017, local hail storm caused severe damages by heavy hail and strong winds in some areas of northwestern and central parts of Lao PDR.

Local Storm in Vientiane Capital (17 March 2017)

Hail Storm in Muang Phonthong, Luangprabang (17 March2017)

Hail Storm in Vientiane Province (16 March 2017)

On 9 May 2017, lightning strike caused of 16 buffalos died in Ban Nakham, Phonkham District, Khammouane Province.

Lightning strike on 9 May 2017

In May 2017 local storm caused flash flood in Muang Kenethao, Xaiyabouly Province.

	
Road damages	Bridges damages

In July 2017, heavy rainfall caused severe damages on landslides in northern and central provinces such as: Six people were killed in landslide in northern Lao province Phongsaly after almost two weeks of rainfall hit the region. Four people were killed in landslides in Muang Med, Vientiane province. The landslides not only affected to the people but also affected to transportation and agriculture sectors.

During the tropical cyclones passed over Lao PDR (in July to September), its brought the heavy rainfall with wind gusts in Lao PDR caused severe damages on flash flood, landslides and flood plain such as:

- Two people were killed by flash flood and many severely impacted as heavy rain lashed multiple districts in Oudomxay Province.

Flash flood in Oudomxay Province

- Torrential rain has caused the deaths of 10 people around the country after heavy downpours and winds lashed many provinces, with the damage being assessed at about 55.5 billion kip. Tropical storm Talas, Sonca, Doksuri and tropical depression affected large swathes of Laos from the end of July to the mid-September. Some 14 provinces have been impacted by persistent heavy rain, landslides, and flooding, namely Phongsaly, Huaphan, Luang Namtha, Xieng Khuang, Oudomxay, Xayaboury, Vientiane, Borikhamxay, Khammuan, Savannakhet, Champassak, Saravan, Xekong and Attapeu.

Early Warning and Dissemination

From January to October 2017, DMH issued the warnings such as: local storm warnings, landslides warnings, flash flood warning warnings and flood plain warnings. All warnings sent directly to Prime's Minister Office and media and public by using telephone, fax, email, website, facebook and What Apps. Resulted, people can receive the warning information in time.

ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

ສັນຕິພາບ ເອກະລາດ ປະຊາທິປະໄຕ ເອກະພາບ ວັດທະນະຖາວອນ

ກະຊວງຊັບພະຍາກອນທຳມະຊາດ ແລະ ສິ່ງແວດລ້ອມ

ກົມອຸຕຸນິຍົມ ແລະ ອຸທົກກະສາດ

ເລກທີ 0671 /ກອຕທ

ນະຄອນຫຼວງວຽງຈັນ, ວັນທີ 24 ກໍລະກົດ 2017

ແຈ້ງເຕືອນໄພ ພາຍຸໝຸນເຂດຮ້ອນ ໃນໄລຍະວັນທີ 25 ຫາ 27 ກໍລະກົດ 2017

ພາຍຸຊົງກາ (SONCA) ຫົວທີ 8 ປະຈຳປີ 2017 ໄດ້ກໍ່ຕົວຂຶ້ນຢູ່ເຂດທະເລຈີນໃຕ້ ຊຶ່ງໃນເວລາ 8 ໂມງ ຂອງວັນທີ 24 ກໍລະກົດ 2017 ມີຈຸດສູນກາງຢູ່ເສັ້ນ ຂະໜານທີ 17.2 ອົງສາເໜືອ, ເສັ້ນແວງທີ 111.3 ອົງສາ ຕາເວັນອອກ ແລະ ຄວາມໄວລົມສູງສຸດຢູ່ໃກ້ ຈຸດສູນກາງ 65 ກິໂລແມັດຕໍ່ຊົ່ວໂມງ.

ພາຍຸຫົວນີ້ ຈະເຄື່ອນທີ່ຜ່ານພາກໃຕ້ຂອງເກາະໄຮໜັນ ແລ້ວຜ່ານແຂວງວິງ ຂອງປະເທດຫວຽດນາມ ໃນຄ່ຳຄືນວັນທີ 25 ກໍລະກົດ ແລະ ຈະເຄື່ອນທີ່ຜ່ານ **ແຂວງ ບໍລິຄຳໄຊ, ຄຳມ່ວນ, ສະຫວັນນະເຂດ** ໃນຕອນເຊົ້າວັນທີ 26 ກໍລະກົດ ຊຶ່ງຈະເຮັດໃຫ້ມີສະພາບຝົນຕົກປານກາງ ແລະ ຕົກໜັກ ແຜ່ຂຶ້ນໄປ ຮອດພາກເໜືອ: ແຂວງ ຫຼວງພະບາງ, ໄຊຍະບຸລີ, ຊຽງຂວາງ, ໄຊສົມບຸນ ແລະ ແຜ່ລົງໄປຫາພາກໃຕ້: ແຂວງ ສາລະວັນ, ຈຳປາສັກ, ເຊກອງ ແລະ ອັດຕະປື. ຈາກນັ້ນ, ກໍ່ຈະອ່ອນກຳລັງລົງເປັນພາຍຸດີເປຣ ຊັນຜ່ານນະຄອນຫຼວງວຽງຈັນ, ແຂວງ ວຽງຈັນ ແລະ ຜ່ານເຂົ້າປະເທດໄທ. **ດັ່ງນັ້ນ, ຈຶ່ງຂໍແຈ້ງເຕືອນ ເຖິງອຳນາດການປົກຄອງທຸກພາກສ່ວນ ແລະ ພໍ່ແມ່ປະຊາຊົນ ທີ່ອາໄສຢູ່ບັນດາ ແຂວງດັ່ງກ່າວ ຈົ່ງມີ ສະຕິກຽມພ້ອມຮັບມືກັບສະພາບນ້ຳຖ້ວມຊ້ຳ, ດິນເຈື່ອນ, ນ້ຳຖ້ວມອັ່ງ, ລົມພັດແຮງ ຊຶ່ງຈະເປັນອັນຕະ ລາຍຕໍ່ຊີວິດ ແລະ ຊັບສິນອັນມີຄ່າຂອງພໍ່ແມ່ປະຊາຊົນ, ພ້ອມນີ້ກໍ່ໃຫ້ກະກຽມເຄື່ອນຍ້າຍວັດຖຸສິ່ງ ຂອງ ແລະ ສັດລ້ຽງໄປໄວ້ບ່ອນທີ່ປອດໄພ, ຂໍໃຫ້ຕິດຕາມການລາຍງານສະພາບອາກາດ ແລະ ນ້ຳ ຈາກ ກົມອຸຕຸນິຍົມ ແລະ ອຸທົກກະສາດຢ່າງເປັນປະຈຳ.**

ຫົວໜ້າກົມ

ຄັນທະບີ ຊຸນພິນ

Figure 2: Warning bulletin for tropical cyclone.

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 southern part and construct 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).

II. Summary of Progress in Priorities supporting Key Result Areas

1. Enhancement of the meteorological and hydrological networks over Lao PDR.

Main text:

Floods, droughts, and extreme weather are the dominant hazards in Lao PDR and cause loss of life, damage agricultural production, and threaten livelihoods. The number of significant flood events has been increasing over the years. Furthermore, climatic variability is expected to exacerbate food insecurity and result in an increase in food prices. Lao PDR's population is predominantly rural based and most of the population is subsistence farmers or fishers. As a result natural hazards have drastic affects on the poor and vulnerable and pose a serious challenge for water resources management and poverty alleviation in the country. Consequently, flood and drought proofing to reduce risk is a priority for sustainable development and for protecting the population.

Following the severe flooding and devastation in 2008, Typhoon Ketsana in 2009, and Typhoons Haima and NokTeng in 2011, the Government of Lao PDR has increased its effort to improve natural disaster preparedness.

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

DMH of Lao PDR will strengthen to collaborate with international organization and donors to expand the number of hydrological and meteorological stations as well upgrading to telemetry system. But the challenging is all the system from different system should be integrated into one system.

Priority Areas Addressed:

- Japan's International Cooperation Agency (JICA) has initiated a project to improve meteorological and hydrological services in Lao PDR. The project, which began in September 2013, plans to improve the timeliness of forecasts and warning through more accuracy meteorological and hydrological forecasts, and more reliable and timely real-time hydro-meteorological data. The support from JICA includes training and the installation of eighteen (18) Automatic Weather Observing Stations (AWS), eight (8) automatic water level and rainfall stations, and the supporting data management systems, as well as the upgrading of the GTS message switch system of the World Meteorological Organization (WMO) Information System (WIS). The upgrade on the WIS will enable for the Department Meteorology and Hydrology to receive Numerical Weather Prediction (NWP) products generated by Global Weather Prediction Centres (GWPC) as well as high-resolution satellite imagery from Japan's HIMAWARI satellite on a frequency of once every 3 minutes.
- The Mekong Integrated Water Resource Management Project (M-IWRMP) has been designed to address natural hazards, which are caused by water and weather related events within an integrated water resource management context. The first phase of the project will strengthen hydro-meteorological capacities in Lao PDR in total 16 Automatic Weather Observation Stations and 8 Automatic Water Level Stations, and construction of National Early Warning Center which located at DMH's headquarter.
- Under Flood and Drought Management and Mitigation Project under Asian Development support to upgrade 19 Automatic Water Level Station, 5 Automatic Weather Observation Stations and equipment for running Numerical Weather Prediction.
- Under MRC project to upgrade 12 Automatic Water Level Station along the Mekong River and its tributaries.

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2. 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

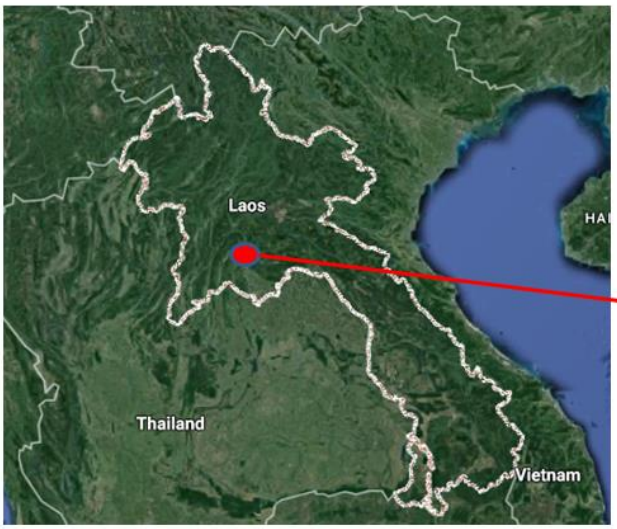
cooperate to install: the Automatic Rainfall Warning System (ARWS) and Flash Flood Alert System (FFAS) in Lao PDR. In the Year 2016, the installation completed in one district namely Vang Vieng District of Vientiane Province, and for the year 2017 will move to install in another district namely Muang Houn of Oudomxay Province.

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

NDMI and DMH will take the efforts to complete all installation during for Flash Flood Alert System in Muang Houn of Oudomxay Province.

Priority Areas Addressed:

2 Automatic Water Level station installed in Vang Vieng District, Vientiane Province
2 Warning posts installed in Vang Vieng District, Vientiane Province
Sever installed at Vang Vieng Met Office and DMH's headquarter



In year 2016, the Department of Meteorology and Hydrology of Lao PDR has selected one district to install the Automatic Rainfall Warning System (ARWS) and Flash Flood Alert System (FFAS): Vang Vieng District, Vientiane Province.

Water Level and Rain gauge station in Pha Tang,

Water Level and Rain gauge station in

Vang Vieng District	Vang Pho, Vang Vieng District
	
Warning post in ban Muang Song	Warning Post in Ban Huay Yea

For year 2017:

- Completed site survey in Muang Houn, Oudomxay province
- Completed site selection for installation of Flash Flood Alert System in Muang Houn, Oudomxay province.
- Detail designed completed.
- Completed procurement the equipment and all equipment already stored in warehouse in Muang Houn.

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