MEMBER REPORT
Lao PDR

ESCAP/WMO Typhoon Committee
18th Integrated Workshop
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28 November – 1 December 2023

CONTENTS

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

1. Meteorological Assessment

The 2023 weather patterns in Lao PDR from January through October demonstrated significant regional variation. January saw light to moderate rainfall in the northern, eastern, central, and southern regions, while the northwestern areas experienced dry conditions. Early February was characterized by consistent light rain across all regions, interspersed with moderate rainfall in some areas.

March continued with a uniform pattern of light rain throughout the country, but this shifted in the latter half of the month to include thunderstorms, lighter storms, and strong winds, along with hail in certain locations. The trend of thunderstorms, varying from light to moderate intensity and often accompanied by hail and strong winds, persisted into late April.

From May to June, thunderstorm activity was widespread, with certain regions experiencing moderate to heavy rainfall. This was followed from mid-July to August by an extended period of light to moderate rain covering large areas, and notably heavy to very heavy rainfall in the central and southern regions.

September through October maintained a pattern of light to moderate rainfall across Lao PDR, with occasional heavy rain in specific areas. The latter half of October saw light to moderate thunderstorms in several regions.

Overall, the central and southern provinces, such as Pakse and Saravane, received an above-average downpour compared to historical averages, with Pakse showing a striking increase in rainfall. Meanwhile, some northern provinces like Phongsali and Xiangkhouang observed less rainfall than usual. These observations confirm that the prevalent weather conditions were not directly attributable to tropical cyclones but were rather influenced by local storm systems and the southwest monsoon, which significantly contributed to the overall climatic conditions in Lao PDR throughout the year. See Figure 1and Table 1

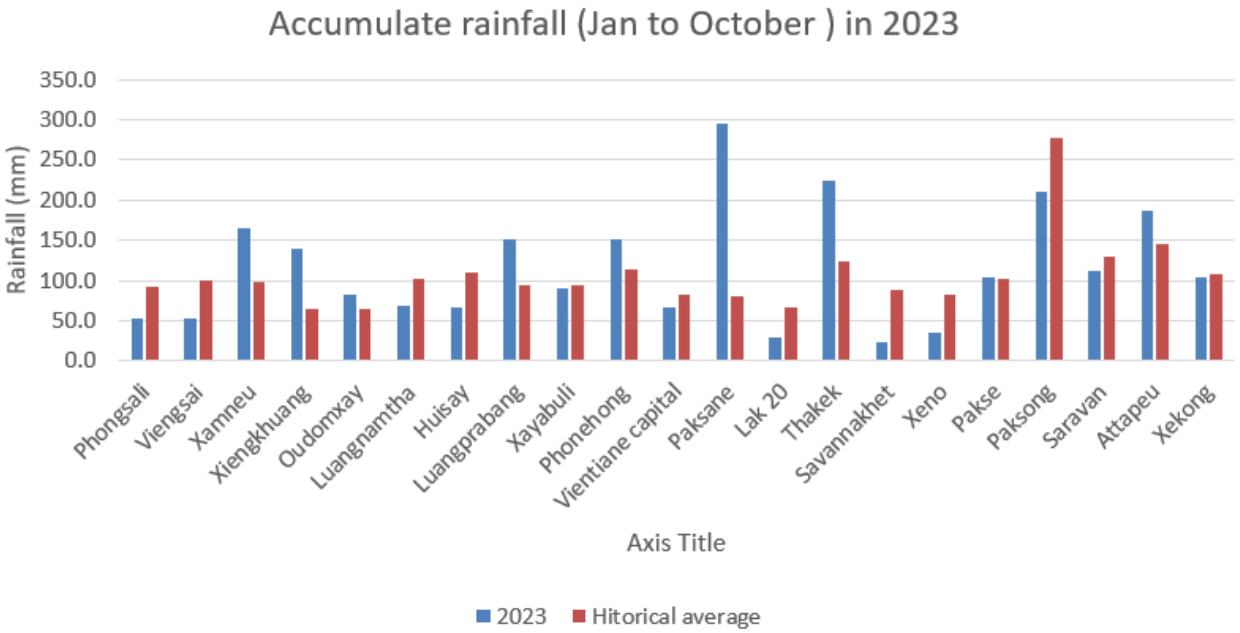


Figure 1 Accumulate Rainfall January to October 2023

Table 1 % of Rainfall at stations in each region of Lao PDR in 2023 compared to long-term average.

		Rainfall 2023		long term average Rainfall			%		Δ			(%) rainfall Jan to Oct 2023
No	station	Oct	Jan to Oct	Oct	Jan to Oct	Annual	Month	Year	Month	Jan to Oct	Year	
1	Phongsali	52.6	1351.6	92.8	1525.9	1589.6	56.7	85.0	-40.2	-174.3	-238.0	
4	Viengsai	52.9	1152.5	100.5	1493.9	1556.6	52.6	74.0	-47.6	-341.4	-404.1	North-Eastern Region
5	Xamneu	164.3	1602.8	97.2	1291.5	1282.3	169.0	125.0	67.1	311.3	320.5	**96.3**
6	Xiengkhuang	139.0	1454.7	64.3	1403.1	1437.6	216.2	101.2	74.7	51.6	17.1	
7	Oudomxay	82.2	1092.7	64.2	1375.1	1430.4	128.0	76.4	18.0	-282.4	-337.7	
2	Luangnamtha	69.1	959.6	102.2	1445.7	1518.6	67.6	63.2	-33.1	-486.1	-559.0	North-Western Region
3	Huisay	66.1	1062.7	110.3	1813.6	1873.4	59.9	56.7	-44.2	-750.9	-810.7	**77.1**
8	Luangprabang	150.4	1339.5	94.0	1279.5	1309.9	160.0	102.3	56.4	60.0	29.6	
9	Xayabuli	89.5	1142.5	95.1	1288.3	1312.5	94.1	87.0	-5.6	-145.8	-170.0	
10	Phonehong	151.9	2200.7	113.6	2226.9	2283.4	133.7	96.4	38.3	-26.2	-82.7	
11	Vientiane capital	66.9	1464.9	83.2	1649.3	1671.1	80.4	87.7	-16.3	-184.4	-206.2	
12	Paksane	294.8	3472.8	80.4	3019.7	3036.9	366.7	114.4	214.4	453.1	435.9	Central Region
13	Lak 20	30.1	1728.4	66.5	1613.3	1620.7	45.3	106.6	-36.4	115.1	107.7	**107.6**
14	Thakek	224.4	2627.2	124.2	2166.9	2187.3	180.7	120.1	100.2	460.3	439.9	
15	Savannakhet	24.0	1755.9	88.8	1479.6	1470.6	27.0	119.4	-64.8	276.3	285.3	
16	Xeno	34.4	1737.9	82.4	1553.3	1594.8	41.7	109.0	-48.0	184.6	143.1	
17	Pakse	104.5	2224.7	101.8	1964.5	1983.5	102.7	112.2	2.7	260.2	241.2	
18	Paksong	210.7	3081.0	276.6	3352.3	3432.1	76.2	89.8	-65.9	-271.3	-351.1	Southern Region
19	Saravan	112.2	2111.9	129.7	2012.0	2029.8	86.5	104.0	-17.5	99.9	82.1	**101.1**
20	Attapeu	187.2	2323.5	145.5	2157.8	2185.6	128.7	106.3	41.7	165.7	137.9	
21	Xekong	103.6	1387.1	108.1	1428.1	1487.6	95.8	93.2	-4.5	-41.0	-100.5	
	Country average	114.8	1775.0	105.8	1787.6	1823.5	112.8	96.7	9.0	-12.7	-48.6	**95.5**

Impacted of Southwest monsoon

In March 2023, a low-pressure system enveloped Lao PDR, bringing with it a wave of hot weather across the country, characterized by moderate rain, thunder, lightning, and strong winds. Hail was reported in several regions, significantly affecting the lives of people and animals, as well as the agricultural sector.

The early to mid-March period saw a high-pressure system of cold air exerting mild to moderate force over Laos, coupled with east wind flow in the central and southern parts and west wind flow in the northern part. This combination led to hot conditions, thunder, lightning, strong winds, and hail, predominantly during the afternoons and evenings. On 24th March, Thateng Village in Sekong Province experienced inclement weather with rain, thunder, strong winds, and hail, causing damage to structures in Kantha lath, Suong, and Fao Villages in Salavan District, with similar incidents reported in Paksong District.

Figure 2 Hail during March in northern region of Lao PDR

From early to mid-July, low pressure in combination with the southwesterly monsoon current affected all parts of Laos, leading to hot weather with light thunderstorms regionally and moderate ones in certain areas. By the end of July, a low-pressure channel associated with a tropical cyclone in the South China Sea passed through northern and central Laos, triggering light to moderate, and in some regions, heavy to very heavy rain. This resulted in several days of continuous heavy rains, causing flash floods in Xayabuly Province, particularly affecting Ban Sibounhueng and Ban Thenkham which are nestled amidst the mountains. This flash flood resulted in damage to people's properties and livestock on 29th and 31st July, 2023.

Figure 3 Flash Flood in Xayabuly Province, July 2023

Between August and September 2023, a low-pressure trough related to a tropical cyclone in the South China Sea brought varying rainfall to northern and central Laos. This led to widespread flash floods and landslides. Notably, from 1st to 7th August, there were reports of flooding, flash floods, and landslides across numerous locations, from the central to the southern regions of Laos. Vangvieng District experienced significant flooding on two occasions, 14th and 26th August.

Figure 4 Flash Flood at Vangvieng District, August 2023

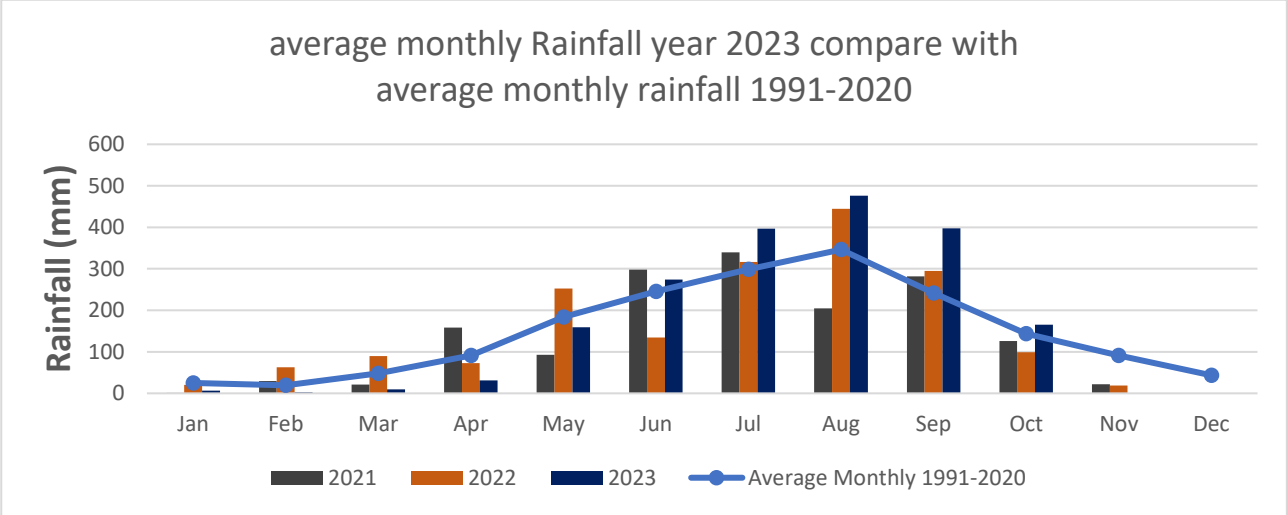
A significant landslide occurred in Thong Houk Village, Anuvong District, Xaisomboon Province, on 12th August. On 29th August, flash floods hit the northern regions, particularly in Ban Kok Ngeiw and Ban Hueixieng in Luang Prabang Province.

On September 10th, 2023, a prolonged spell of rain led to a significant surge of forest water in Huai Xai District, Bokeo Province, culminating in a flash flood that

affected BorLex, Namjang, Namtoy, and Jalernxai villages located along the Yong River, these villages bore the brunt of the flooding, which wreaked havoc on residential areas, infrastructure, and agricultural lands. The deluge not only disrupted production but also resulted in the tragic loss of numerous livestock, swept away by the forceful currents.

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

In 2023, Lao PDR experienced substantial challenges due to heavy monsoonal rains, leading to overflowing rivers and flash floods in the northern and central regions of the country. Notably, in July, August and September 2023, the average monthly rainfall was significantly higher than the long-term average, exacerbating flood conditions.



Along the Mekong River, the water level at key station such as Vientiane km4 station was increased to 11.82 meter exceed the warning level (warning level:11.50-meter, danger level: 12.50-meter) during 10 August 2023 (See Figure 5) caused flood damage to the properties along the riverbank (see Figure 6)

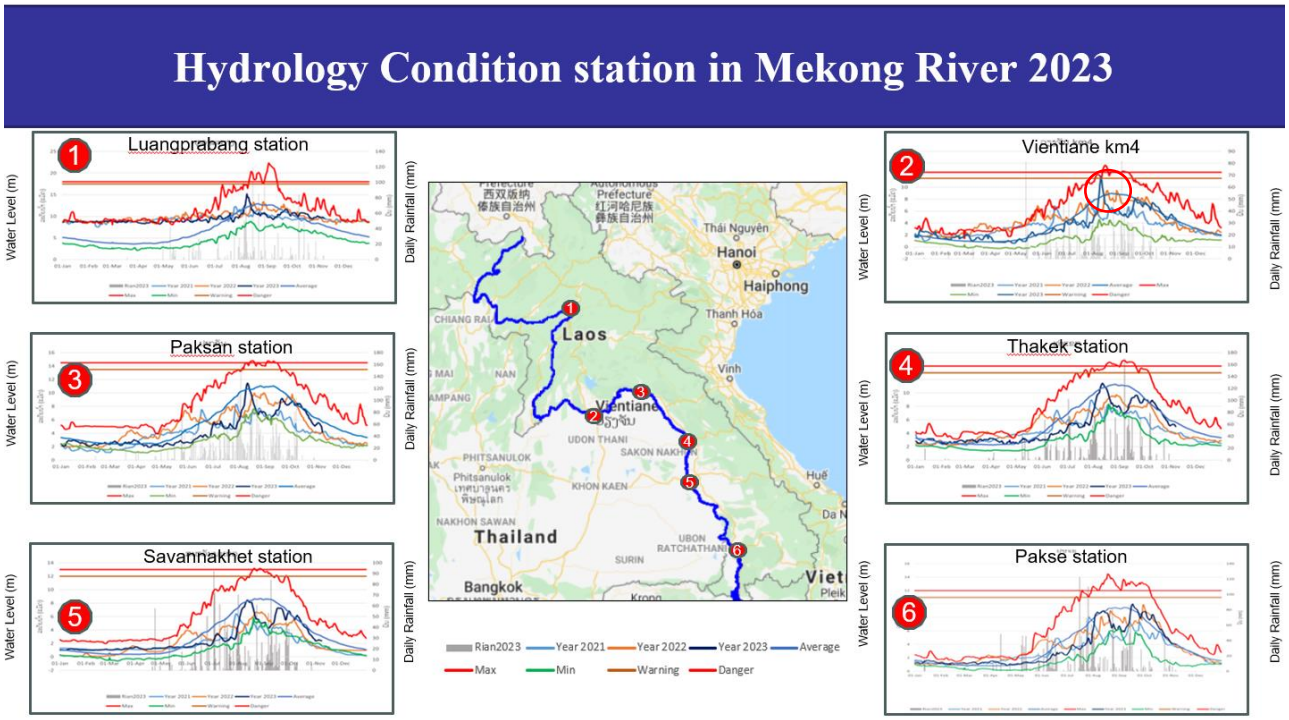


Figure 5 Water level along Main Mekong River in 2023

Figure 6 Flood damage along Mekong Riverbank at Vientiane Capital Augst, 2023

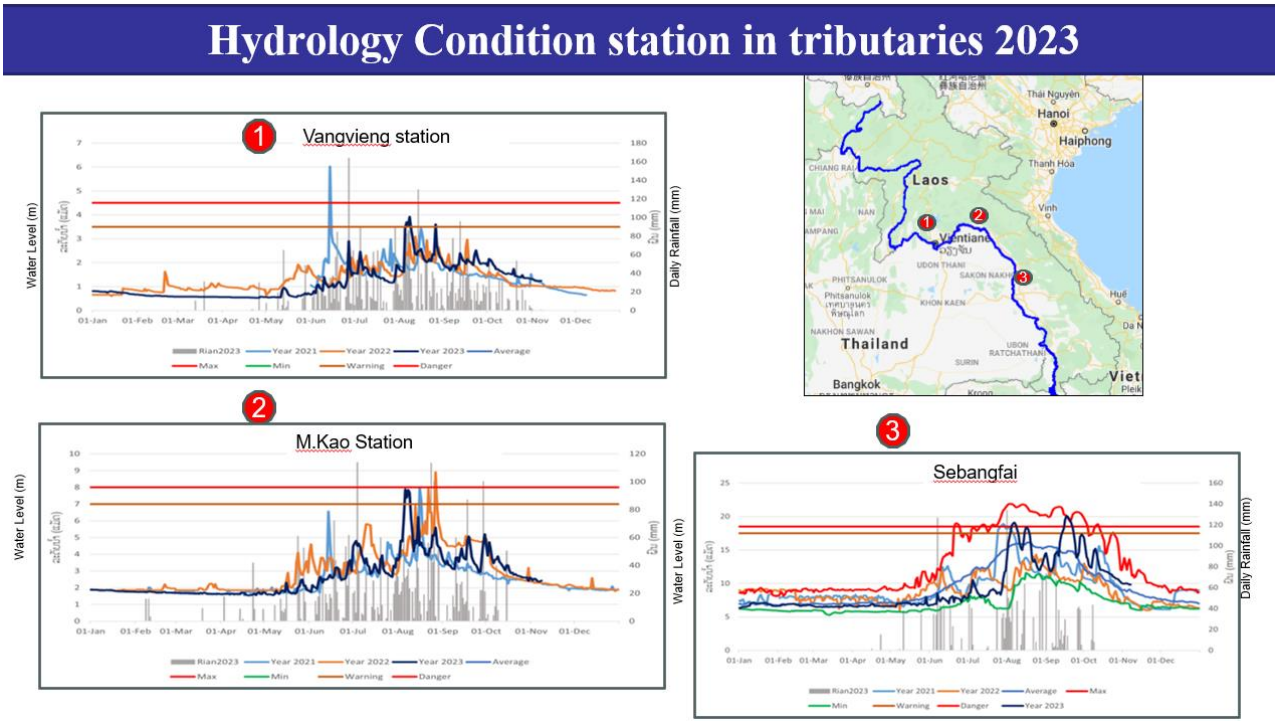


Figure 7 Water level at Main tributaries of Mekong River in 2023

Specific incidents of flooding and landslides are detailed, such as the flash flood in Xayabuly province on July 29, 2023, and the subsequent flooding in Khammuane Province on July 31, 2023.

In July, Northern and central regions of Lao PDR experienced heavy rainfall due to the influence of the south-west monsoon. On 29th July 2023, a flash flood occurred in Xayabuly province (northern region), affecting several villages including Sibounhueng and Thenkham villages, which are nestled amidst the mountains. This flash flood event caused damage to people's properties and livestock. Similarly, on 31st July 2023, torrential rainfall led to flooding in Khammuane Province (Central Region).

In August, the potent south-west monsoon led to extensive rainfall across Laos, particularly affecting the central and southern regions. A week-long deluge resulted in widespread flooding, flash floods, and landslides throughout various parts of the country. From 1st to 7th August 2023, incidents of flooding, flash floods, and landslides were reported in numerous locations in the central to the southern regions of Laos. Notably, the district of Vangvieng experienced flooding twice—once on the 14th and again on the 26th of August. On 29th August, flash floods struck the northern regions of Laos, specifically in the Kok Ngeiw and Hueixieng villages of Luang Prabang Province.

3. Socio-Economic Assessment

The flood damage in Lao PDR in 2023 significantly affected the socio-economic landscape of the country. According to the National Disaster Management Committee (NDMC), during July to August the devastation spanned 12 provinces, 69 districts, and 590 villages, impacting 29,735 households and 134,775 people, including 64,050 women. There were 2 injuries, 12 fatalities, and substantial property damage. The total damage amounted to approximately 69.15 million USD, with urgent and long-term recovery funds needed, estimated at around 5.21 million USD and 40.77 million USD, respectively.

Lao PDR has developed capacities for data collection and analysis at national and sub-national levels. Investments in hydrometeorological stations have bolstered early warning systems, particularly for floods. The country also undertook a national climate change vulnerability assessment in 2019, with ongoing efforts to create sub-national flood and drought maps and village-level disaster preparedness plans (United Nations in Lao PDR, 2023a)

The country has established the Disaster Management Law 2019, the National Disaster Risk Reduction Strategy 2021-2030, and the Resilience Framework 2022-2025. These initiatives are integrated into the 9th National Socio-Economic Development Plan, enhancing disaster management and response capabilities. Lao PDR is also working on sub-national disaster risk reduction strategies, with three provinces already having their plans in place.

Significant investments have been made in infrastructure, such as flood control systems and renewable energy, to mitigate disaster risks. The National Financial Protection Strategy against Disaster Risks was launched in 2023, focusing on strengthening resilience, particularly for women and youth.

The country has improved its humanitarian logistics, establishing mobile centers to enhance response operations. Capacity building for large-scale response operations and improved post-disaster recovery assessment tools are also in place.

Lao PDR is part of the Early Warnings for All (EW4ALL) global initiative, aimed at providing early warnings to everyone on Earth by 2027. This initiative contributes to disaster risk knowledge, preparedness, and response enhancement.

The post-Covid-19 scenario, coupled with the 4F crisis (food, fuel, fertilizer, and finance), underscores the importance of continued investment in disaster risk reduction. The long-term view for resilience investments is crucial, especially as climate change escalates the frequency and scale of disasters (United Nations in Lao PDR, 2023).

4. Regional Cooperation

Regional cooperation plays a pivotal role in enhancing disaster risk reduction and weather forecasting capabilities in Lao PDR. Several key initiatives and partnerships have been instrumental in strengthening the country's preparedness and response to weather-related hazards.

- **Weather Forecasting Cooperation with Korea Meteorological Administration (KMA):** The partnership between Lao PDR and the Korea Meteorological Administration (KMA) exemplifies successful regional cooperation in weather forecasting. This collaboration has focused on improving Lao PDR's capacities in disaster risk reduction and early warning systems. Funded by KMA, the project has involved installing a satellite data receiving system and providing specialized training for its operation and application. This initiative enhances Lao PDR's ability to manage, prevent, and respond to disasters effectively by improving its disaster-related information base.

- **Flood Risk Mapping: Climate Risk and Early Warning Systems (CREW) Project:** In another significant collaborative effort, Lao PDR, along with Cambodia, is part of a four-year project launched in 2021 to strengthen multi-hazard early warning systems. Funded by the Climate Risk and Early Warning Systems (CREWS) Initiative with a budget of $5.5 million, the project aims to reduce disaster impacts by increasing the utilization of early warning and risk information. The CREWS project focuses on addressing deficiencies in early warning systems, enhancing the capacities of national meteorological and hydrological services, and improving national disaster risk management organizations. It aims to provide more timely, impact-based, and precise forecasts and warnings, improve dissemination of warnings, enhance preparedness and response capabilities, and integrate gender and disability inclusiveness in early warnings.

- **Flood Forecasting with Mekong River Commission (MRC):** Lao PDR's collaboration with the Mekong River Commission (MRC) is critical for flood forecasting and management in the region. The MRC coordinates flood mitigation activities basin-wide, benefiting member countries. It uses data from 138 hydro-meteorological stations to predict water levels at 22 forecast points on the Mekong mainstream, disseminating this information to National Mekong Committees, national forecasting agencies, civil society organizations, the media, and the public. The MRC also provides daily river flood forecasting for the Mekong, along with flash flood guidance during the wet season. Additionally, the MRC offers weekly river flow monitoring during the dry season and weekly and monthly drought forecasting and early warning,

facilitating government agencies and communities in their preparedness for flood and drought events.

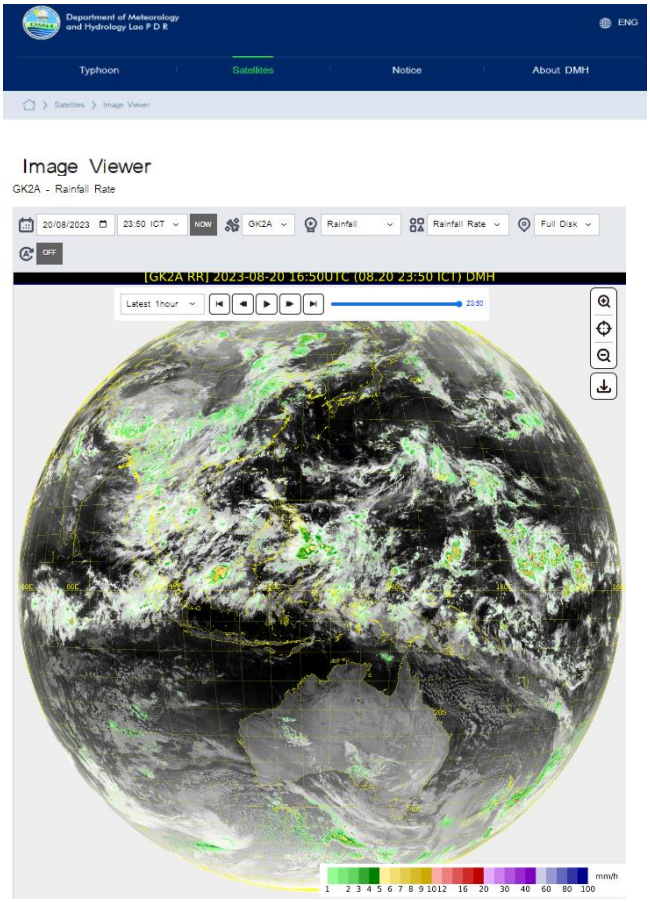
These cooperative efforts reflect Lao PDR's commitment to regional partnerships in enhancing its disaster risk management capabilities. By leveraging international expertise and resources, Lao PDR is better equipped to handle the increasing frequency and intensity of climate and weather-related hazards.

II. Summary of Progress in Priorities supporting Key Result Areas

1. Disaster Risk Reduction in Lao People's Democratic Republic: Satellite data receiving system for the Communication Ocean and Meteorological Satellite (COMS)

Main text:

The Weather Forecasting Cooperation project with the Korea Meteorological Administration (KMA) focuses on significantly enhancing Lao PDR's disaster risk reduction and early warning capabilities. The project's cornerstone is the installation of a sophisticated satellite data receiving system, enabling the country to access crucial meteorological data. This system is essential for improved weather forecasting, particularly in monitoring and predicting weather-related hazards. Additionally, the project includes comprehensive training for local personnel in the operation and application of this technology, ensuring sustainable and effective utilization of these advanced tools.



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

- Key opportunities: include the potential for more accurate and timely weather forecasts and enhanced national capacity for disaster preparedness and response.
- Challenges: may involve the technical maintenance of the equipment and continuous training needs to keep pace with technological advancements.

Priority Areas Addressed:

Meteorology:

- Priority 4: Enhance the capacity to monitor and forecast typhoon activities, particularly in genesis, intensity, and structure change.

- Priority 5: Develop and enhance typhoon analysis and forecast techniques from nowcast to medium-range, and seasonal to long-range prediction.
- Priority 6: Enhance and provide typhoon forecast guidance based on NWP including ensembles, weather radar, and satellite-related products, such as QPE/QPF.
- Priority 7: Promote communication among typhoon operational forecast and research communities in the Typhoon Committee region.
- Priority 8: Enhance training activities with TRCG, WGH, and WGDRR in accordance with Typhoon Committee forecast competency, knowledge sharing, and exchange of latest development and new techniques.

DRR:

- Priority 19: Share experience/knowhow of DRR activities including legal and policy framework, community-based DRR activities, methodology to collect disaster-related information.

Key Pillars of UN's Early Warnings for All (EW4All) Initiative Addressed:

Key Pillars of EW4All	**Please ✓ the related pillar(s)**
Disaster risk knowledge and management	
Detection, observation, monitoring, analysis, and forecasting	✓
Warning dissemination and communication	
Preparedness and response capabilities	✓

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2. Flood Risk Mapping - CREW Project

Main text:

The Climate Risk and Early Warning Systems (CREWS) Project, with a budget of $5.5 million, aims to strengthen multi-hazard early warning systems in Lao PDR. This project addresses deficiencies in existing early warning systems by enhancing the capacities of national meteorological, hydrological services, and disaster risk management organizations. It involves developing more accurate, timely, and impact-based forecasts and warnings, grounded in a thorough understanding of hazards and their potential impacts. Additionally, the project emphasizes the importance of effectively disseminating these warnings to the communities and institutions most in need, incorporating considerations of gender and disability inclusiveness.

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

- The project presents opportunities to significantly reduce the impacts of disasters through improved risk information and early warning systems.
- Challenges include integrating these advanced systems into current disaster management practices and ensuring inclusivity and accessibility of warnings.

Priority Areas Addressed:

Integrated:

- Priority 3, enhancing collaborative activities with other regional/international frameworks/organizations, including technical cooperation.

Hydrology:

- Priority 10: Improve typhoon-related flood monitoring, data collection, and sharing framework.
- Priority 11: Enhance capacity in typhoon-related flood risk management and integrated water resources management.
- Priority 12: Strengthen capacity in effective flood forecasting and impact-based early warning.
- Priority 14: Increase capacity in utilization of advanced science and technology for typhoon-related flood forecasting and management.

DRR:

- Priority 19, sharing experience and know-how of DRR activities, including community-based DRR activities and methodology to collect disaster-related information.

Key Pillars of UN's Early Warnings for All (EW4All) Initiative Addressed:

Key Pillars of EW4All	Please ✓ the related pillar(s)
Disaster risk knowledge and management	✓
Detection, observation, monitoring, analysis, and forecasting	✓
Warning dissemination and communication	✓
Preparedness and response capabilities	✓

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Appendix I - Priority Areas of Working Groups for the Strategic Plan 2022-2026

WG	Priorities
Integrated	1. Strengthen the cooperation between TRCG, WGM, WGH, and WGDRR to develop impact-based forecasts, decision-support and risk-based warning.
	2. Strengthen cross-cutting activities among working groups in the Committee.
	3. Enhance collaborative activities with other regional/international frameworks/organizations, including technical cooperation between TC/AP-TCRC and TC/PTC cooperation mechanism.
Meteorology	4. Enhance the capacity to monitor and forecast typhoon activities particularly in genesis, intensity and structure change.
	5. Develop and enhance typhoon analysis and forecast techniques from nowcast to medium-range, and seasonal to long-range prediction.
	6. Enhance and provide typhoon forecast guidance based on NWP including ensembles, weather radar and satellite related products, such as QPE/QPF.
	7. Promote communication among typhoon operational forecast and research communities in Typhoon Committee region.
	8. Enhance training activities with TRCG, WGH, and WGDRR in accordance with Typhoon Committee forecast competency, knowledge sharing, and exchange of latest development and new techniques.
	9. Enhance RSMC capacity to provide regional guidance including storm surge, in response to Member's needs.
Hydrology	10. Improve typhoon-related flood (including riverine flood, flash flood, urban flood, and coastal flood) monitoring, data collection and archiving, quality control, transmission, processing, and sharing framework.
	11. Enhance capacity in typhoon-related flood risk management (including land-use management, dam operation, etc.) and integrated water resources management and flood-water utilization.
	12. 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.
	13. Develop capacity in projecting the impacts of climate change, urbanization and other human activities on typhoon-related flood disaster vulnerability and water resource availability.
	14. Increase capacity in utilization of advanced science and technology for typhoon-related flood forecasting, early warning, and management.
DRR	15. Provide reliable statistics of mortality and direct disaster economic loss caused by typhoon-related disasters for monitoring the targets of the Typhoon Committee.
	16. Enhance Members' disaster risk reduction techniques and management strategies.
	17. Evaluate socio-economic benefits of disaster risk reduction for typhoon-related disasters.
	18. Promote international cooperation of DRR implementation project.
	19. Share experience/knowhow of DRR activities including legal and policy framework, community-based DRR activities, methodology to collect disaster-related information.