Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin

01-07 August 2023

Prepared by
The Regional Flood and Drought Management Centre
08 August 2023

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Contents

Figures

Table

Key Messages

Key messages for this weekly report are presented below:

Rainfall and its forecast

- Rainfall focused in the areas from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam, including the upper, middle and lower parts of the LMB covering Lao PDR and Cambodia, varying from 0.50 millimetres (mm) to 434.50 mm.

- There will be moderate and heavy rainfall for the next 5 days over the Mekong region from 08 to 12 August 2023 although there is no any movement of tropical storm moving towards the Mekong region.

Water level and its forecast

- According to MRC's observed water level at Jinghong, it showed fluctuating water levels from **537.15 m** and **538.20 m** during 1-7 August 2023. The current level is staying about 1.48 m higher than its LTA value. The outflow at Jinghong station varied between 2,290.00 m^3/s and 3,220.00 m^3/s during 1-7 August 2023.

- With the fluctuated outflow from Jinghong upstream and rainfall at catchment inflow, water levels of monitoring stations at Chiang Saen in Thailand increased about 0.85 m from 1 to 7 August 2023, staying about 0.62 m lower than its LTA level. WLs at Xieng Kok upstream of Chiang Saen increased about 3.57 m.

- Water level at Chiang Khan in Thailand from 1 to 7 August 2023 increased about 3.18 m and stayed about 0.57 m lower than its LTA value, while water level at Vientiane increased about 3.07 m staying about 0.37 m lower than its LTA level. Water levels at Nong Khai increased 3.00 m and stayed about 1.55 m lower than its LTA, while at Paksane it increased about 2.09 m, staying about 2.25 m lower than its LTA value. Water levels at these stations are still considered low.

- Water levels from Nakhon Phanom to Pakse rapidly increased from 2.52 m to 3.42 m, due to the contribution of heavy rainfalls and inflows from upstream. The current WLs at Nakhon Phanom, Khong Chiam and Pakse stations are staying higher than their LTA value, considering normal.

- From the stretches of the river from Stung Treng, Kratie to Kompong Cham, water level increased and stayed higher than their LTA value, which was also considered normal.

- The water volume of the Tonle Sap Lake was lower than its LTA (about 50%) during the same period from 1 to 7 August 2023, which is considered low.

- Water levels from downstream at Chaktomuk and Phnom Penh Port to Prek Kdam in Cambodia increased and still staying lower than their LTA level. WL at Koh Khel on the Bassac river is higher than its LTA value.

- The current water levels for stations are lower than their LTA value. WLs at the 2 tidal stations at Tan Chau and Chau Doc were fluctuating and lower than their LTA value, due to tidal effect during this monitoring period, considered critical.

- Over the next five days, the water levels at the upper, middle and lower parts from Chiang Saen to Khong Chiam are expected to go up due to heavy rainfall and dam operation upstream, while at downstream from Stung Treng down to the Mekong floodplain area are going to fall.

Drought condition and its forecast

- During July 31-Aug 6, some moderate droughts were detected in Cambodia and Laos covering some area of Prhea Vihear, Pursat, Kandal, Prey Veng, Phnom Penh, Luangnamtha, and Sekong. Other areas were normal.

- The three-month forecast shows that **August** is expected to be moderately dry in the upper north, severely and extremely dry in the west covering mainly Thailand, and extremely dry in the south-east covering southern Laos and 3S areas. In **September**, Xayaburi, Vientiane and Luang Prabang of northern Laos are likely to be hit by moderate drought, while central Laos in the eastern LMB is likely to be facing some moderate and severely droughts. In **October**, moderate and severe droughts are forecasted for the north-west, west, and south-west areas of the LMB covering some areas of northern Laos, Thailand, and north-western Cambodia. Most parts of Laos and Vietnam are likely not at any risk.

1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydrological and drought situation in the Lower Mekong River Basin (LMB) for the period from **01 to 07 August 2023**. The trend and outlook for water levels are also presented.

This analysis is based on the daily hydro-meteorological data provided by the Mekong River Commission (MRC) Member Countries (MCs) – Cambodia, Lao PDR, Thailand, and Viet Nam – and on satellite data. All the water levels indicated in this report refer to an above zero gauge of each station.

The report covers the following topics that are updated weekly:

- General weather patterns, including rainfall patterns over the LMB
- Water levels in the LMB, including in the Tonle Sap Lake
- Flash flood and drought situation in the LMB
- Weather, water level and flash flood forecast, and
- Possible implications.

Mekong River water levels are updated daily and can be accessed from:
http://ffw.mrcmekong.org/bulletin_wet.php.

Drought monitoring and forecasting information is available at:
http://droughtforecast.mrcmekong.org

Flash flood information is accessible at: http://ffw.mrcmekong.org/ffg.php

2 General Weather Patterns

The weather outlook bulletins for three months (August, September and October) and the weather maps issued by the Thai Meteorological Department (TMD) were used to verify weather conditions in the LMB.

Since the beginning of August 2023, moderate to heavy rainfall has dropped over the LMB with increasing trend of water levels in both mainstream and tributaries. The data from the TMD predict that between August and September 2023, moderate high-pressure system from China will extend to upper Thailand and the East-Sea of Viet Nam. Moderate to heavy rains, strong wind and increasing temperature are likely to take place in the upper part of LMB. Temperature will increase in the northeast and then move to other places of the region in August. The monsoon trough lies across the LMB throughout the period with rainfall and isolated heavy rains in the upper and middle parts from Chaing Saen to Pakse.

Figure 1 presents the weather map during 31 July and 03 August 2023, indicating that a low-pressure cell was active in the East-Sea of Viet Nam, having rainfall impact on the LMB area. Generally, the Mekong region was influenced by the southwest monsoon and the ITCZ band located in the region with active low-pressure cell located over northern Viet Nam. Under this weather condition, moderate to extreme rainfall occurred over most parts of LMB, especially over central part of Lao PDR, eastern part of Thailand in LMB area, the 3S area and 4P area, from central to eastern parts and coastal area of Cambodia, and from central to northern Viet Nam.

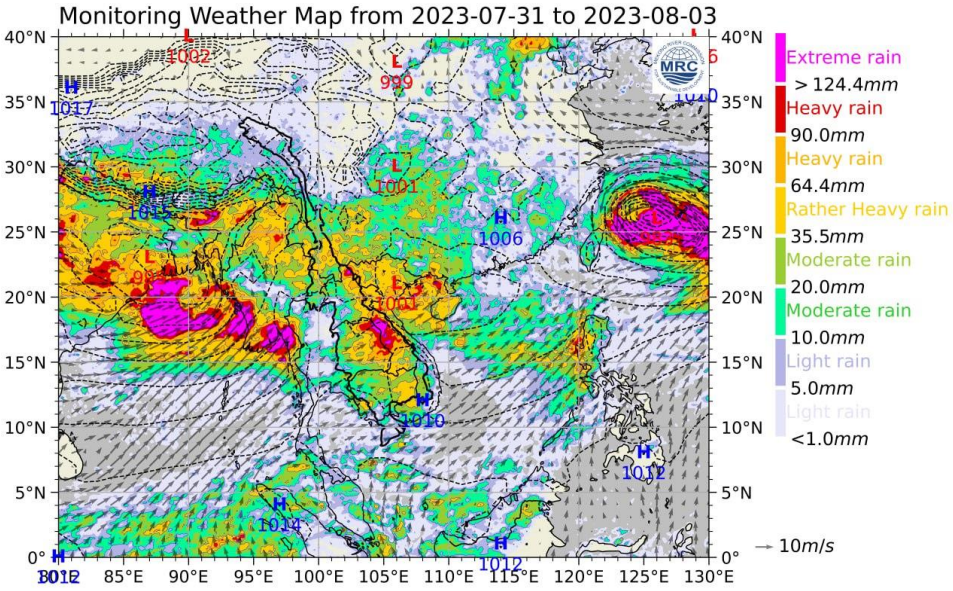


Figure 1. Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), the highest probability of warm and dry conditions is predicted over the lower part of the Mekong region from 07 to 20 August 2023. Therefore, the Mekong region is likely dominated by warm and dry conditions, which may bring less rainfall and warm temperatures in general to the upper and lower parts of the LMB. **Figure 2** shows the outlook of weather condition from 07 to 20 August 2023 in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

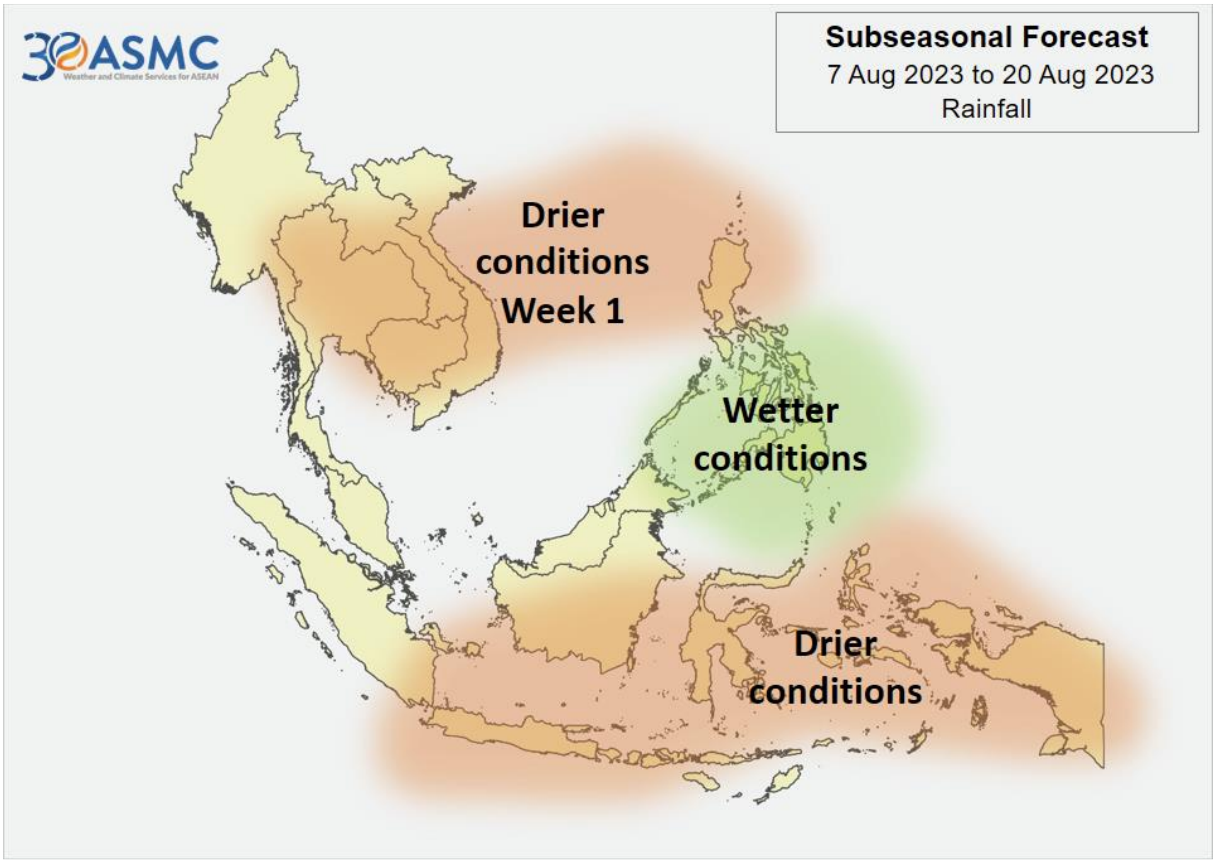


Figure 2. Outlook of wet and dry conditions over the Asian countries by ASMC.

2.1 Tropical depressions (TD), tropical storms (TS) and typhoons (TY)

There was no movement of any storm from the sea to the LMB during 01-07 Aug 2023. No low-pressure line was observed over the Mekong region as shown in Figure 1. The active system for the LMB on July 31 is displayed in Figure 3.

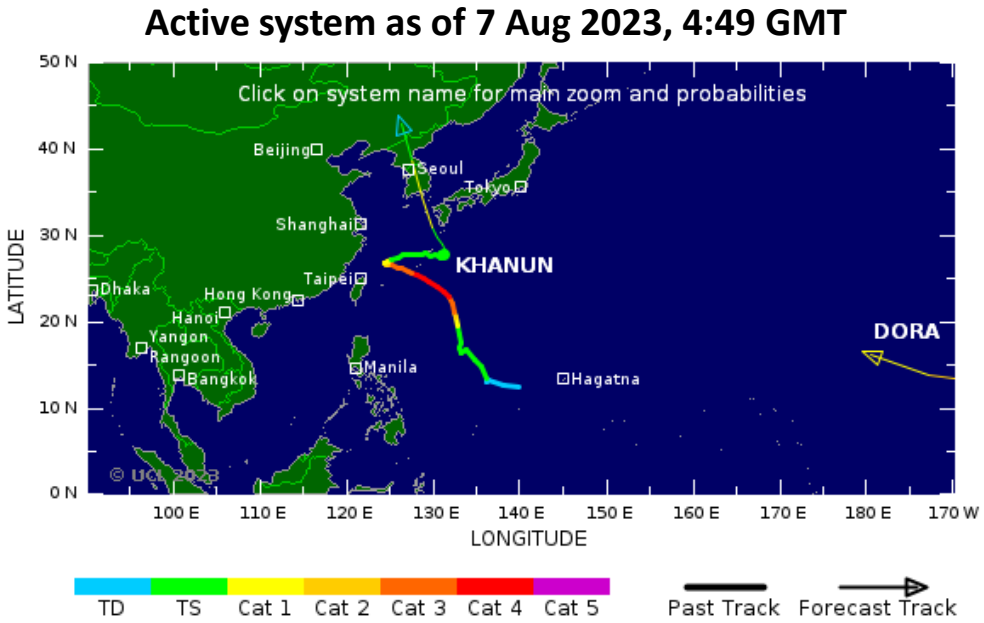


Figure 3. A tropical depression risk observed on 07 August 2023.

2.2 Rainfall patterns over the LMB

This week from 01 to 07 August 2023, rainfall was observed at the key stations along the mainstream from Chiang Saen in Thailand to the lower part stations in Cambodia and Tan Chau and Chau Doc in Viet Nam of the Lower Mekong Basin, varied from 0.50 mm to 434.50 mm. The highest rainfall of this week report was recorded from Paksane to Thakhek in Lao PDR reaching 434.50 mm. The total rainfall of this week report in the Mekong region, compared with last week and its long-term-average (LTA) is showed in Figure 4. The total rainfall of this week was considered high in the upper and middle parts of the LMB, compared with its last week rainfall in most of the stations.

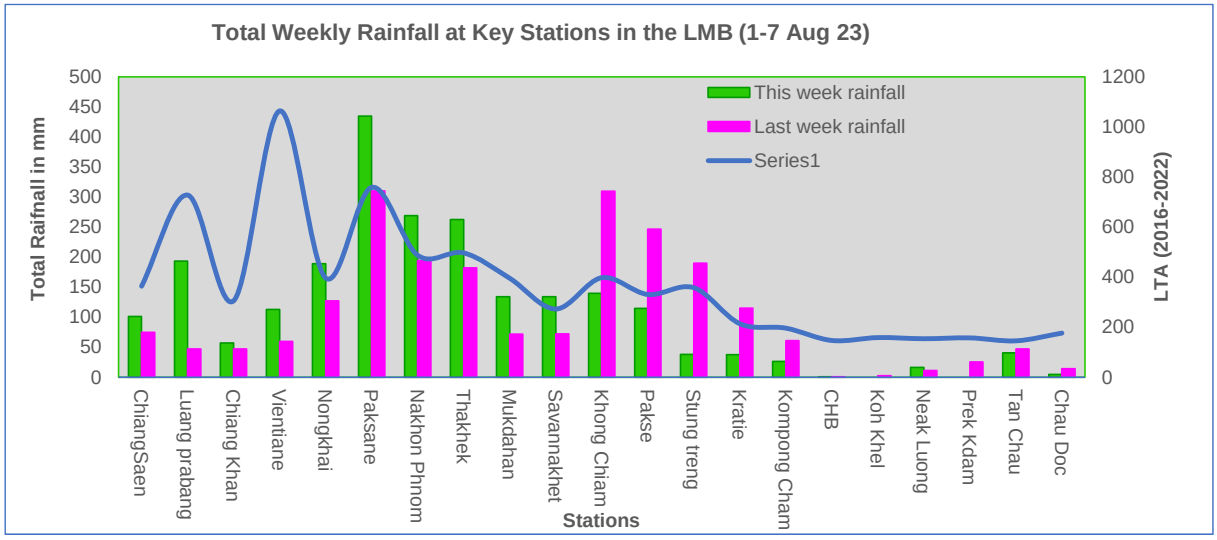


Figure 4. Weekly total rainfall at key stations in the LMB during 1-7 August 2023.

To verify area rainfall distribution, Figure 5 shows a map of the weekly accumulated rainfall based on observed data provided by the MRC Member Countries – Cambodia, Lao PDR, Thailand, and Viet Nam – from 1 to 7 August 2023.

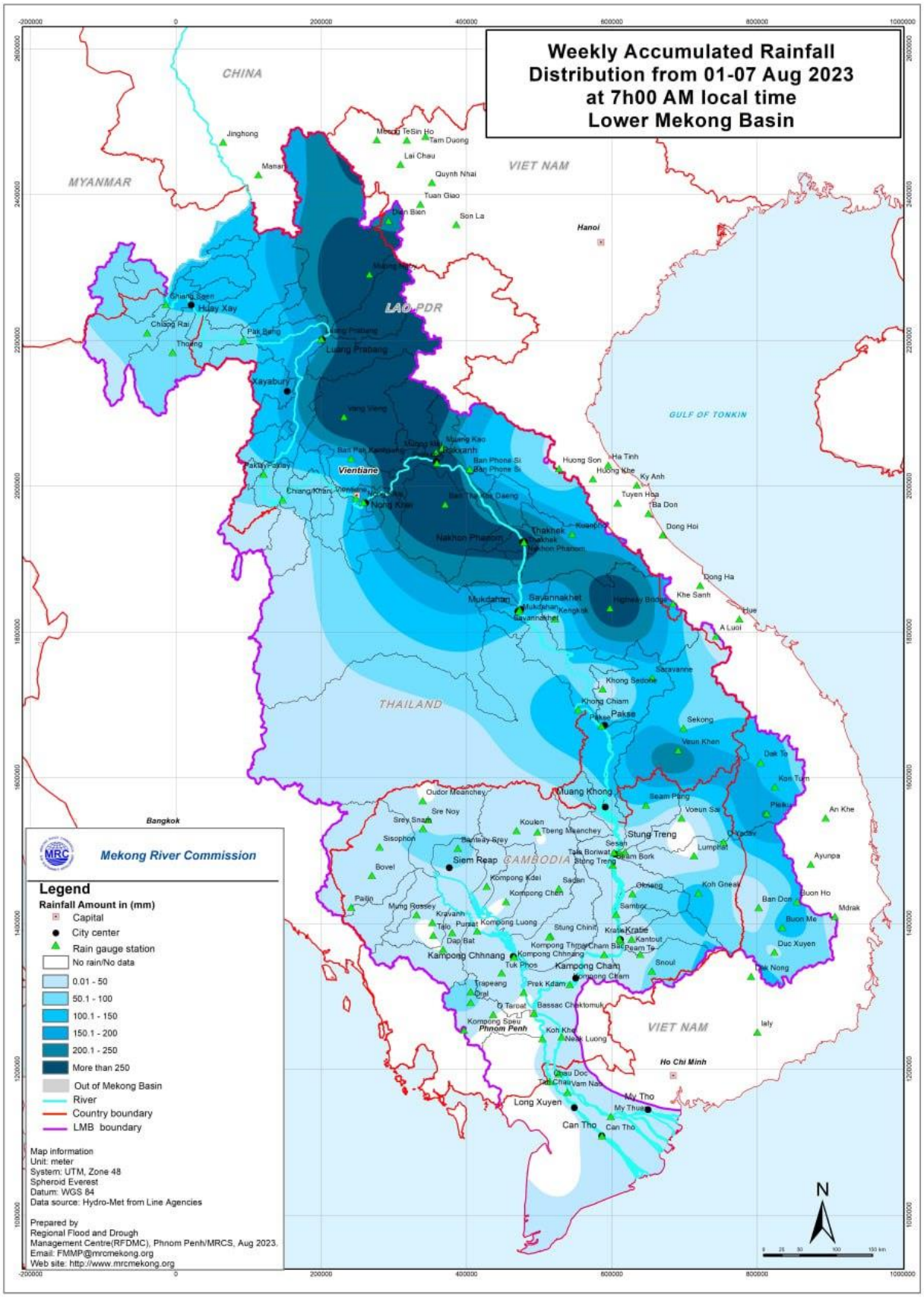


Figure 5. Weekly rainfall distribution over the LMB during 1-7 August 2023.

3 Water Levels in the Lower Mekong Basin

The hydrological regimes of the Mekong mainstream are illustrated by recorded water levels and flows at key mainstream stations: at Chiang Saen in Thailand to capture mainstream flows entering from the Upper Mekong Basin (UMB); at Vientiane in Lao PDR to present flows generated by climate conditions in the upper part of the LMB; at Pakse in Lao PDR to investigate flows influenced by inflows from the larger Mekong tributaries; at Kratie in Cambodia to capture overall flows of the Mekong Basin; and at Viet Nam's Tan Chau and Chau Doc to monitor flows to the Delta.

The key stations along the LMB and their respective model application for River Flood Forecasting during the wet season from June to October and River Monitoring during the dry season from November to May are presented in Figure 6. The hydrograph for each key station is available from the MRC's River Flood Forecasting: http://ffw.mrcmekong.org/overview.php. The weekly water levels and rainfall at each key station are summarised in Annex A.

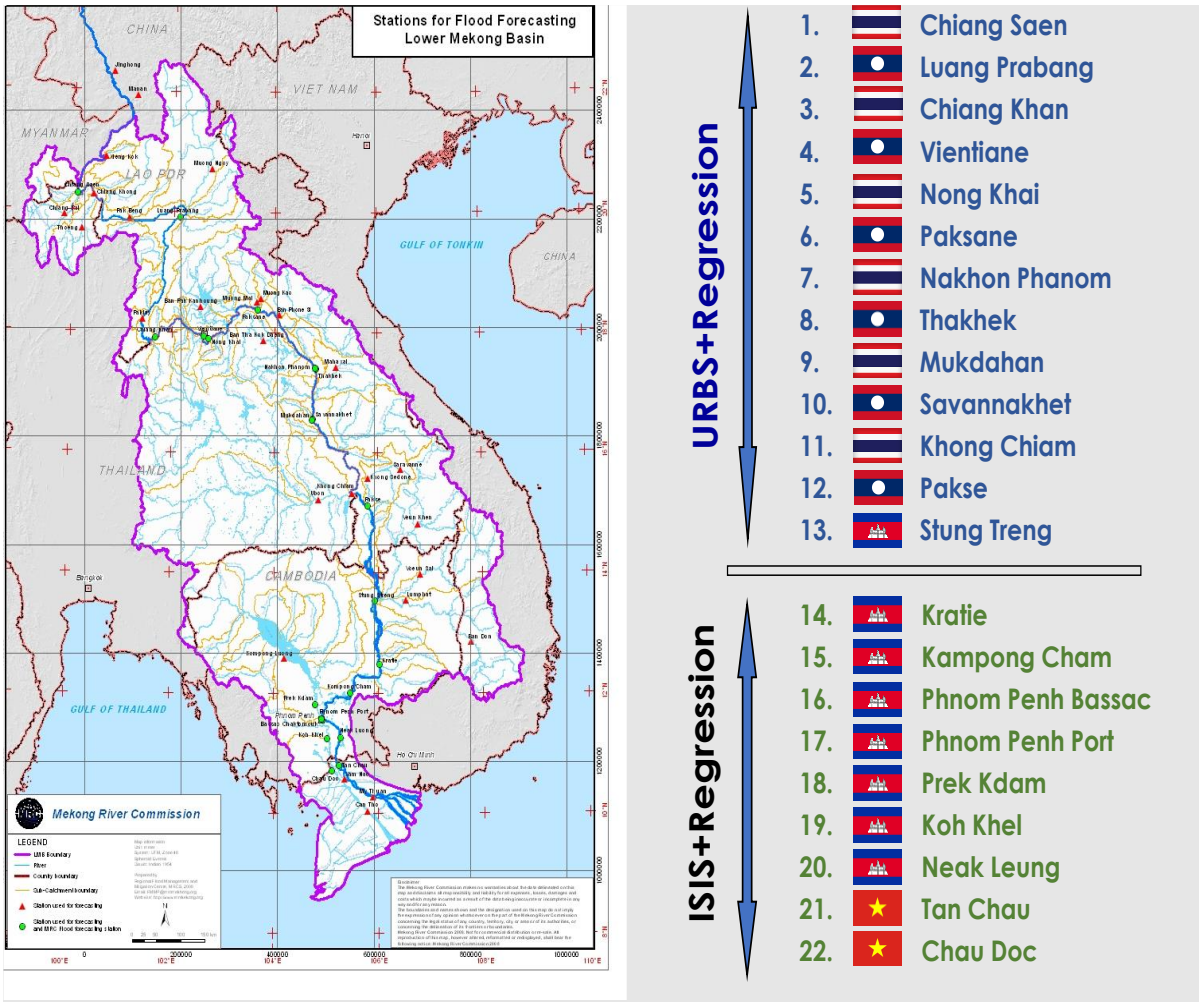


Figure 6. Key stations and model application for River Monitoring and Flood Forecasting.

According to MRC's observed water level at Jinghong, it showed fluctuated levels between **537.15 m** and **538.20 m** during 1-7 August 2023 (recorded on 7:00 am). The current level is staying about 1.48 m higher than its LTA level (max: 2015-2022) value and about 0.48 m higher than its maximum value. The outflow at Jinghong station varied from 2,290.00 m^3/s to 3,060.00 m^3/s between 1 and 7 August 2023. Figure 7 below presents water level that fluctuated at the Jinghong hydrological station[1], indicating the trend of fluctuating water level up to 7 August 2023.

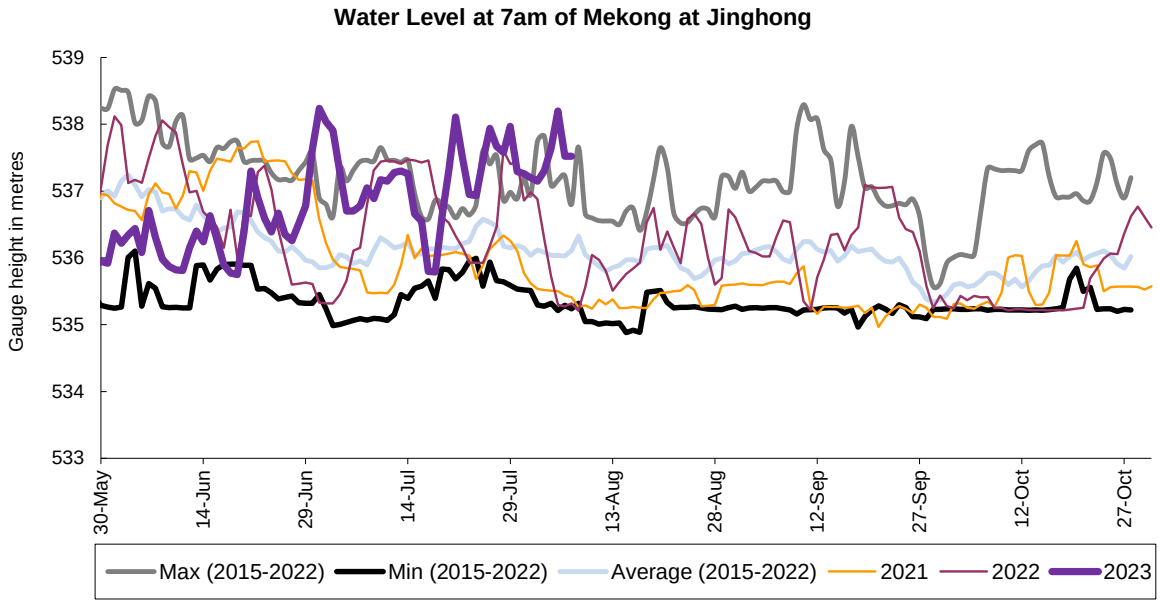


Figure 7. Water level at the Jinghong hydrological station up to 7 August 2023.

With the fluctuated outflow from Jinghong upstream, water levels of monitoring stations at Xieng Kok in Lao PDR, upper of Chiang Saen, significantly increased about 3.57 m; while at Chiang Saen in Thailand it showed an increase of about 0.85 m from 1 to 7 August 2023, staying about 0.62 m lower than its LTA level, considered normal.

Water level at Chiang Khan in Thailand from 1 to 7 August 2023, moreover, increased about 3.18 m and stayed about 0.57 m lower than its LTA value; while water level at Vientiane station increased about 3.07 m and stayed about 0.37 m lower than its LTA level, which was still **considered a normal water level**. Water levels at Nong Khai increased 3.003 m, staying 1.55 m lower than its LTA value. And at Paksane it increased 2.09 m, but still staying about 2.25 m lower than their LTA value, **which was considered low level**.

Water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR significantly increased between 2.52 m and 3.05 m. The current WLs at Nakhon Phanom, Khong Chiam and Pakse are staying higher than their LTA level, **considered normal**. From the stretches of the river at Stung Treng, WL significantly increased 1.27 m and stayed about 0.29 m higher than its LTA, while at Kratie water level was up about 2.92 m, staying 0.89 m higher than its LTA level, **considered normal.**

[1] Near-real time data of hydro-meteorological monitoring at the Jinghong hydrological station is available at https://portal.mrcmekong.org/monitoring/river-monitoring-telemetry.

Water level at Kompong Cham was up about 3.00 m and stayed 0.03 m lower than its LTA value. Water levels at Chaktomuk, Koh Khel, Phnom Penh Port and Prek Kdam in Cambodia were up between 1.66 m and 2.26 m, but WLs at these stations were remaining lower than their LTA level, **considered normal**.

Water levels at 8 out of 22 stations along the Mekong River were staying higher than their LTA value, during this week report. The tidal stations at Chau Doc had WL lower than their LTA value, due to tidal effect during this monitoring period.

Based on hydrological phenomenon, the contribution of inflow water from the upstream of Lancang-Mekong in China to the Mekong mainstream is from 16% to 18% in total during the wet season from June to October. The whole inflow of water into the LMB is influenced by rainfall at the Mekong mainstream and its tributaries during the wet season.

Chiang Saen and Luang Prabang

The water level from 1 to 7 August 2023 at Thailand's Chiang Saen station varied from 4.05 m to 4.90 m, showing 0.62 m lower than its Long-Term-Average (LTA) value, which considered normal. The water level at Luang Prabang station in Lao PDR was up about 3.18 m from 10.50 m to 13.68 m during the reporting period. This level shows 0.80 m higher than its LTA. The trend – sometimes higher or lower to its historical maximum and LTA values – has been observed since early of 2022. The phenomenon was potentially caused by upstream dam operations, downstream Xayaburi dam, and heavy rainfall in the surrounding areas. The water levels at Chiang Saen and Luang Prabang are shown in Figure 8 below.

Being situated between the upstream (Nam Beng, Nam Ou, Nam Suong, and Nam Khan) and downstream (Xayaburi) hydropower dams, the Luang Prabang station has a unique characteristic as it is influenced by the operations of all its surrounding dams. **Thus, the water level at this station can possibly change very rapidly during the early of wet and dry season**.

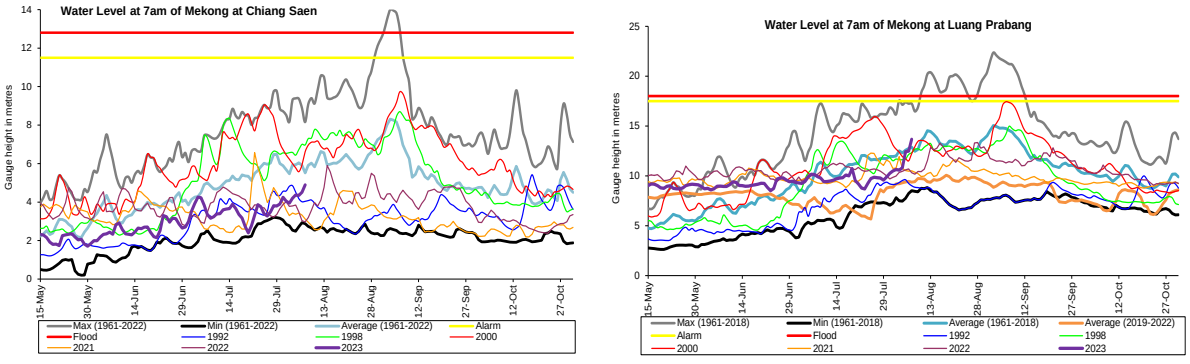


Figure 8. Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) rapidly increased about 3.07 m staying about 0.57 m lower than its LTA value. At Vientiane in Lao PDR it significantly increased about 3.00 m and showed about 0.37 m lower than its LTA during the reporting week of 1-7 August 2023. At Nong Khai station in Thailand, the water level was up

about 3.00 m from 4.15 m to 7.15 m, staying about 1.55 m lower than its LTA value, during the reporting period. At Paksane in Lao PDR, water level increased about 2.09 m from 6.01 m to 8.10 m. The water level at this station was about 2.25 m lower than its LTA value. The recently rapidly increased water levels from Chiang Khan to Paksane were obviously due to the above-average rainfall contributed from the sub-catchment area along with the inflows and water storage in the upstream part. The water levels at Vientiane and Paksane are shown in Figure 9 below.

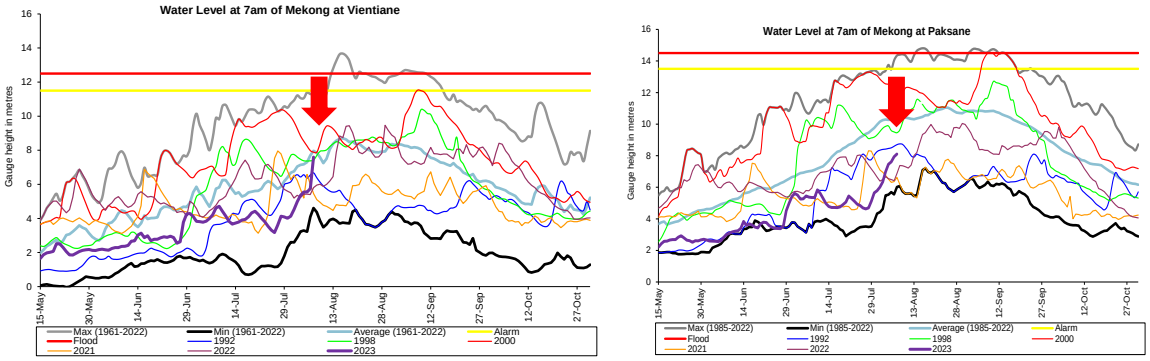


Figure 9. Water levels Veintiane and Paksane in Lao PDR.

Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR significantly increased between 2.52 m and 3.42 m. Consequently, water levels at Nakhon Phanom, Khong Chiam and Pakse stations are rising higher than their LTA value, which is a **normal situation**. Figure 10 shows the water levels at Nakhon Phanom and Pakse stations.

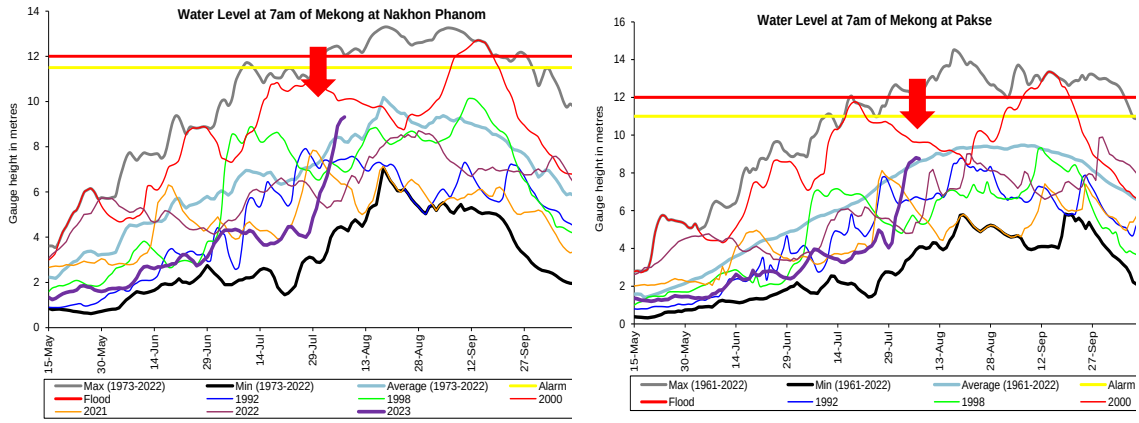


Figure 10. Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR

Stung Treng to Kompong Cham/Phnom Penh to Koh Khel/Neak Luong/Prek Kdam

Following the same trend from the upstream part of the Mekong River and the 3S river (Sekong, Se San, and Sre Pok), the water levels from Stung Treng to Kratie in Cambodia were significantly increasing during 1-7 August 2023. The water levels at Stung Treng increased

about 1.27 m and stayed about 0.29 m higher than its LTA, while at Kratie it increased about 2.92 m, staying about 0.89 m higher than its LTA (as showed in Figure 11). The water level at Kompong Cham station rapidly increased about 3.00 m and was about 0.03 m lower than its LTA. The water levels at these stations were influenced by rainfall in their catchment areas, including Sekong, Se San and Srepok river basins.

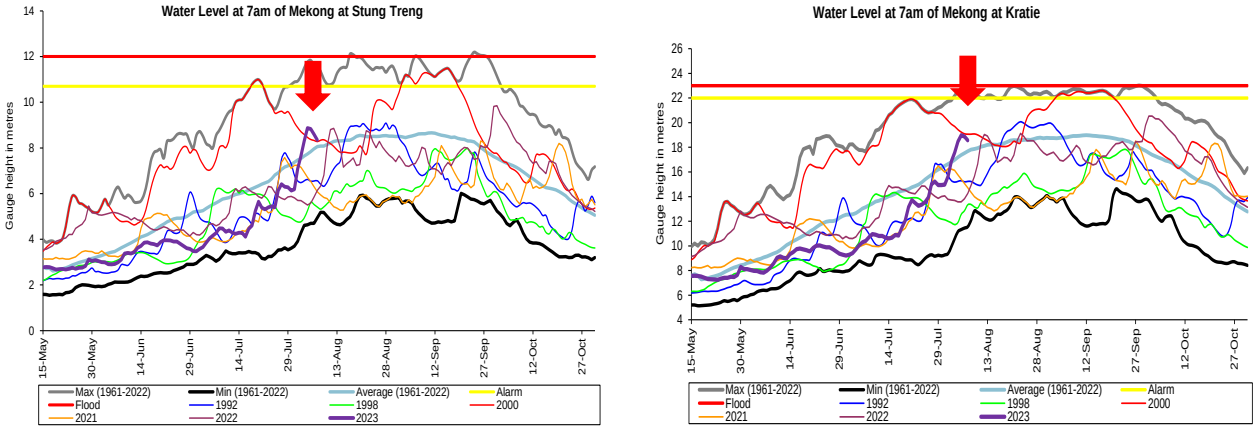


Figure 11. Water levels at Stung Treng and Kratie on the Mekong River.

At Chaktomuk on the Bassac River, due to heavy rainfall and contributed flows from upstream catchment, the water level significantly increased by about 2.08 m and stayed 0.35 m lower than its LTA value; while at Koh Khel, water level increased about 1.78 m, staying 0.31 m higher than its LTA value. The water level at Prek Kdam on the Tonle Sap Lake increased about 1.66 m and was about 0.57 m lower than its LTA value. The water level at the Tonle Sap Lake (observed at Kampong Luong) was similar to Prek Kdam station's water level. The recently increased water level at Prek Kdam was due to rainfall and inflow contributed from upstream of the Tonle Sap Lake area during the reporting period. The water level at the Tonle Sap Lake (observed at Kampong Luong) followed the same trend of Prek Kdam station's water level. From next week, **water levels at most of the stations will rise and is considered normal**.

Tidal stations at Tan Chau and Chau Doc

Like last week, the water levels from 1 to 7 August 2023 at Viet Nam's Tan Chau and Chau Doc were fluctuating due to daily tidal effects from the sea. The fluctuation levels were between -1.25 m and 1.83 m; they were below the range of their LTA level and were **considered normal**.

The Tonle Sap Flow

At the end of the dry season, when water levels along the Mekong River rise then the inflows of the Mekong River return to the Tonle Sap Lake. This phenomenon normally takes place from end of May to July. Based on flow observation at Prek Kdam, the reversed flow from the Mekong River into the Tonle Sap began between 06 and 10 July 2023.

The flows of the Tonle Sap Lake were calculated based on a formula of rating-curves by different water levels at Kompong Luong and Phnom Penh Port for slop and Prek Kdam as cross-section of the Lake. The formula of flows at the Tonle Sap Lake is as follows:

Flows = (WL at Prek Kdam)^1.2*SQRT (WL difference between PP port and Kampong Luong)

Where, WL is water level in m (msl).

Figure 12 shows the seasonal changes of the outflow and the inflow/reversed flow of the TSL at Prek Kdam in comparison with the flows of 2020, 2011, 2022 and their LTA level (1997-2022). Up to August 7 of this reporting period, **it was observed that the main outflow from the Tonle Sap Lake increased due to rainfall and inflows from upstream**. This increased inflow into the Tonle Sap Lake was most likely caused by inflows and rainfall from the catchment area. Up to present, the inflow from the Tonle Sap Lake condition in 2023 is higher than 2020, 2022 but lower than 2021 and its LTA (1997-2022) inflow conditions. For next week, moderate rainfall is forecasted for the Tonle Sap area; and the inflow into the Tonle Sap Lake is likely expected to go up from the current level.

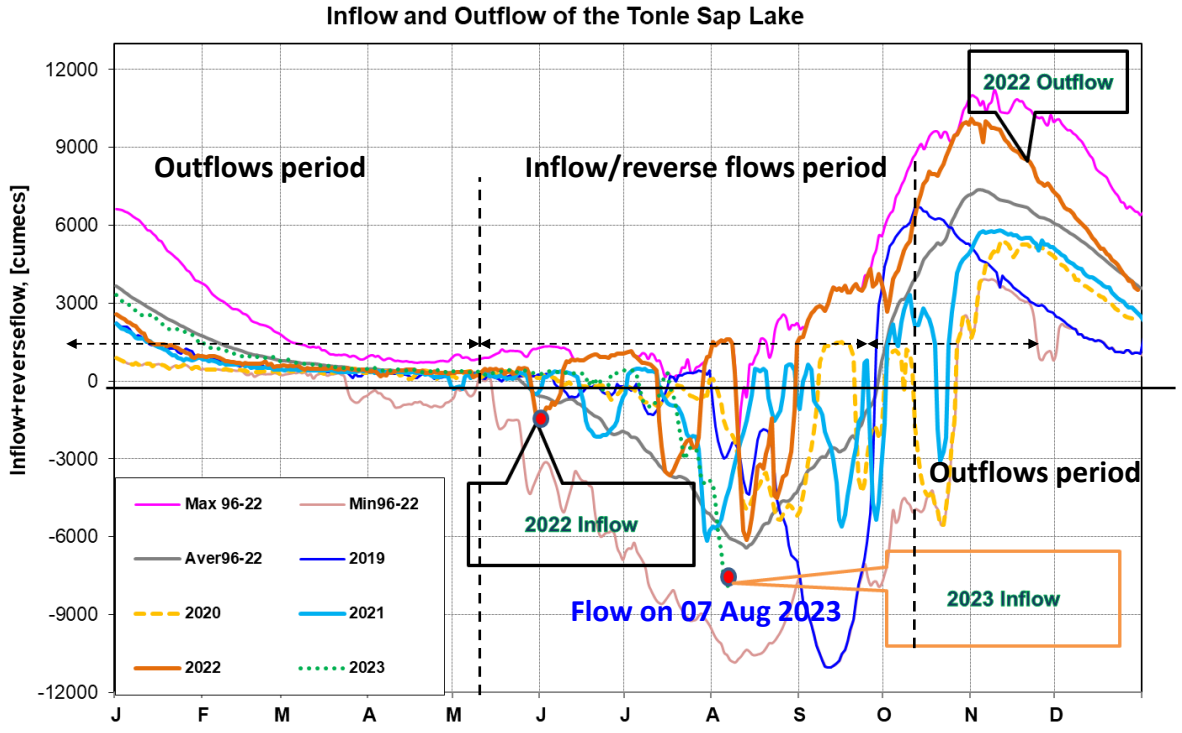


Figure 12. Seasonal change of inflows and outflows of Tonle Sap Lake

Figure 13 shows seasonal changes in monthly flow volumes up to 7 August 2023 for the Lake compared with the volumes in 2020, 2021, 2022 and their LTA, and the fluctuation levels (1997–2022). It shows that up to August 7, **the water volume of the Tonle Sap Lake was higher than 2020, 2022 but lower than 2021 and its LTA (about 50%), during the same period**. The figure is displayed in Table 1, which indicates that the Tonle Sap Lake has been affected by water levels from the tributaries and rainfall in the surrounding sub-catchments and **considered normal situation**.

This demonstrates the influence of the relationships of the reverse and out flows, water levels of the Mekong River, inflows from tributaries, and the flow direction in the complex hydraulic environment of the Tonle Sap Lake during the wet and dry seasons. The data show that about

half of the annual inflow volume into the Tonle Sap Lake has originated from the Mekong mainstream. Thus, flow alterations in the mainstream could have direct impact on the Tonle Sap Lake water levels and on its hydrology.

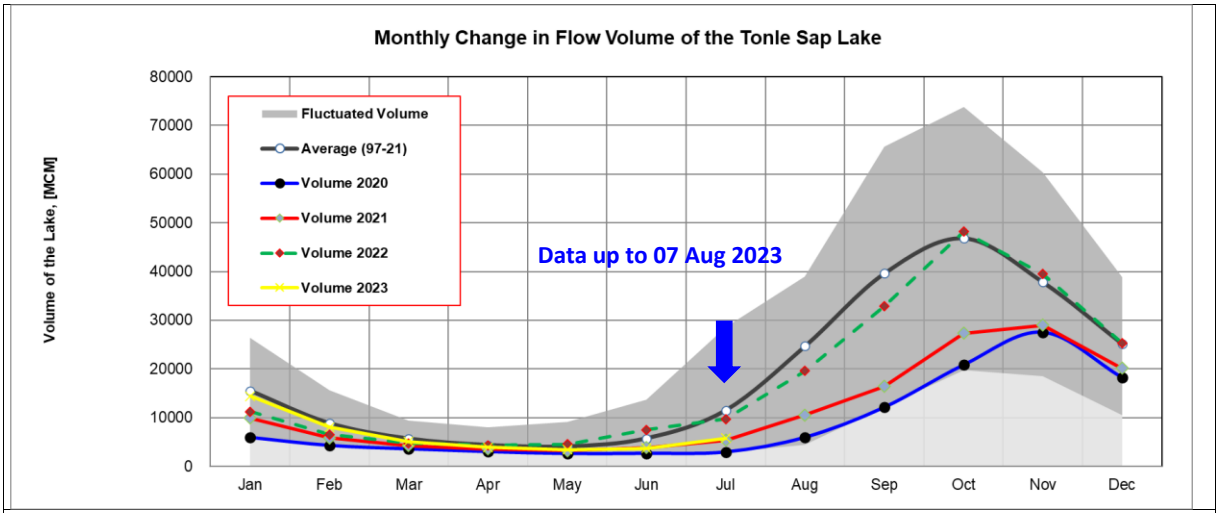


Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.

Table 1. The monthly change in the flow volume of Tonle Sap Lake.

Month	LTA (97-22) [MCM]	Max Volume [MCM]	Min Volume [MCM]	Volume 2019 [MCM]	Volume 2020 [MCM]	Volume 2021 [MCM]	Volume 2022 [MCM]	Volume 2023 [MCM]	Volume in 2023 [%], compared with its LTA
Jan	15523.23	26357.53	5906.80	10285.31	5906.80	9923.80	11214.32	14422.11	92.91
Feb	8837.89	15596.22	4198.60	6019.30	4264.19	5832.97	6558.79	8069.29	91.30
Mar	5654.18	9438.24	3347.07	4354.62	3553.99	4264.88	4736.52	5080.64	89.86
Apr	4346.65	8009.14	2866.91	3667.47	2992.61	3556.68	4288.31	3884.16	89.36
May	4030.23	9176.93	2417.81	3266.43	2594.92	3240.78	4556.83	3438.66	85.32
Jun	5708.30	13635.01	2468.70	3517.06	2641.88	3798.29	7489.04	3689.97	64.64
Jul	11493.25	28599.56	2925.86	4001.99	2925.86	5346.73	9703.79	5740.38	49.95
Aug	24666.69	39015.12	4433.46	7622.71	5941.07	10547.80	19554.70		
Sep	39634.03	65632.35	12105.31	24194.19	12105.31	16382.34	32860.34		
Oct	46873.44	73757.23	19705.50	30358.38	20799.13	27318.21	48199.12		
Nov	37823.16	60367.33	18534.61	19112.65	27546.80	28982.93	39452.53		
Dec	25126.11	38888.95	10563.49	10577.29	18251.65	20170.76	25346.65		
	Critical situation, comapred with historical Min values								
	Normal condition, compared with LTA (Long term average)								
	Low volume situation, comapred with LTA values								
Unit: Million Cubic Meter (1 MCM= 0.001 Km^3)					LTA: Long-Term-Average				

4 Flash Flood in the Lower Mekong Basin

During the weekly monitoring period from August 01 to 07, the LMB received from moderate to very heavy rain and isolated thundershowers in some areas, especially in the north and center of Lao PDR.

According to the MRC-Flash Flood Guidance System (MRC-FFGS) and analysis, low to hight risk of flash flood events were detected during the reporting period in northern and central parts of Lao PDR, some areas of Thailand and Cambodia, and in the northern part of Viet Nam as shown in Figure 14 and Table 2.

Table 2. Detected low-risk flash flood in the LMB during August 01-07.

Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Thailand

Date of FFG product 03-08-2023 6:00 UTC time

01-Hour Flash Flood Risk and Location				03-Hour Flash Flood Risk and Location				06-Hour Flash Flood Risk and Location			
Provinces	Districts	Region	Level Risk	Provinces	Districts	Region	Level Risk	Provinces	Districts	Region	Level Risk
Nakhon Phanom	Muang Nakhon Phanom	Northeastern	Low-Risk	Nakhon Phanom	Muang Nakhon Ph	Northeastern	Low-Risk	Nakhon Phanom	Muang Nakhon Ph	Northeastern	Low-Risk
Nakhon Phanom	Muang Nakhon Phanom	Northeastern	Low-Risk	Roi Et	Muaiwadi	Northeastern	Low-Risk	Nakhon Phanom	Muang Nakhon Ph	Northeastern	Low-Risk
Nakhon Phanom	Pla Pak	Northeastern	Low-Risk	Roi Et	Phon Thong	Northeastern	Low-Risk	Nakhon Phanom	Pla Pak	Northeastern	Low-Risk
Kalasin	Somdet	Northeastern	Low-Risk					Kalasin	Somdet	Northeastern	Low-Risk
Nakhon Phanom	Phon Sawan	Northeastern	Low-Risk					Nakhon Phanom	Phon Sawan	Northeastern	Low-Risk
Nakhon Phanom	Muang Nakhon Phanom	Northeastern	Low-Risk					Nakhon Phanom	Muang Nakhon Ph	Northeastern	Low-Risk
Roi Et	Muaiwadi	Northeastern	Low-Risk					Roi Et	Muaiwadi	Northeastern	Low-Risk
Roi Et	Phon Thong	Northeastern	Low-Risk					Roi Et	Phon Thong	Northeastern	Low-Risk

Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Lao PDR

Date of FFG product 04-08-2023 0:00 UTC time

01-Hour Flash Flood Risk and Location					03-Hour Flash Flood Risk and Location					06-Hour Flash Flood Risk and Location				
Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk
Phongsaly	Samphanh		Northwest	Low-Risk	Khammuane	Hinboon	SENG A LOUN	Northwest	Low-Risk	Phongsaly	May	HOUAYS	Northwes	Low-Risk
Phongsaly	Phongsaly	NAMXA	Northwest	High-Risk	Khammuane	Hinboon		Northwest	Moderate-Risk	Luangprabang	Ngoi		Northwes	Low-Risk
Phongsaly	Samphanh		Northwest	High-Risk	Khammuane	Hinboon	PHA KHONG	Northwest	Low-Risk	Phongsaly	Phongsal	CHAKHA	Northwes	Low-Risk
Phongsaly	khoua	PHIA	Northwest	Low-Risk	Khammuane	Hinboon	NA TANG	Northwest	Moderate-Risk	Phongsaly	Phongsal	PEUYNIS	Northwes	Low-Risk
Oudomxay	La	CHAN MAI	Northwest	Low-Risk	Khammuane	Hinboon	PHANALIENG	Northwest	Low-Risk	Phongsaly	Phongsaly		Northwes	Low-Risk
Luangprabang	Nambak	MOKKOK	Northwest	Low-Risk	Khammuane	Nakai		Northwest	Low-Risk	Phongsaly	Samphanh		Northwes	Low-Risk
Bolikhamxay	Pakkading	NONGBOUA	Northwest	Low-Risk	Khammuane	Nakai		Northwest	Low-Risk	Phongsaly	Phongsaly		Northwes	Low-Risk
Bolikhamxay	Pakkading	NAMDEUA	Northwest	Moderate-Risk	Khammuane	Mahaxay	VANG POUN	Northwest	Low-Risk	Phongsaly	Samphanh		Northwes	Low-Risk
Bolikhamxay	Pakkading	NAMKHOU	Northwest	Moderate-Risk	Khammuane	Mahaxay		Northwest	Low-Risk	Phongsaly	Samphanh		Northwes	Low-Risk
Bolikhamxay	Pakkading	NAMSANG	Northwest	Low-Risk	Khammuane	Xaybouath		Northwest	Low-Risk	Phongsaly	Phongsal	NAMXA	Northwes	Moderate-Ri
Khammuane	Hinboon		Northwest	Low-Risk	Champasak	Paksong		Northwest	Low-Risk	Phongsaly	Samphanh		Northwes	Moderate-Ri
Khammuane	Hinboon	NONG CHANG	Northwest	Low-Risk	Champasak	Paksong		Northwest	Low-Risk	Phongsaly	Samphanl	HINDENI	Northwes	Low-Risk
Khammuane	Nhommalat		Northwest	Low-Risk	Attapeu	Sanxay		Northwest	Low-Risk	Phongsaly	khoua	PHIA	Northwes	Low-Risk
Khammuane	Thakhek	PHON KHAM	Northwest	Low-Risk	Phongsaly	Phongsaly		Northwest	Low-Risk	Oudomxay	La	CHAN M	Northwes	Low-Risk
Khammuane	Hinboon	PHON MENH	Northwest	Low-Risk	Phongsaly	Samphanh		Northwest	Low-Risk	Luangprabang	Nambak	MOKKOI	Northwes	Low-Risk
Khammuane	Hinboon	SENG A LOUN	Northwest	Low-Risk	Phongsaly	May		Northwest	Low-Risk	Luangprabang	Ngoi		Northwes	Low-Risk
Khammuane	Nakai		Northwest	Low-Risk	Phongsaly	May	NAMNENE	Northwest	Low-Risk	Luangprabang	Viengkham		Northwes	Low-Risk
Khammuane	Hinboon		Northwest	Low-Risk						Luangprabang	Ngoi	POUNGF	Northwes	Low-Risk
Khammuane	Hinboon		Northwest	High-Risk						Luangprabang	Pak xeng	HUAYHI	Northwes	Low-Risk
Khammuane	Hinboon	PHA KHONG	Northwest	Low-Risk						Luangprabang	Phonxay	SALANA	Northwes	Low-Risk
Khammuane	Hinboon	NA TANG	Northwest	High-Risk						Luangprabang	Phonxay	HUAYHA	Northwes	Low-Risk

Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Viet Nam

Date of FFG products 07-08-2023 0:00 UTC time

01-Hour Flash Flood Risk and Location				3-Hour Flash Flood Risk and Location in Vietnam				6-Hour Flash Flood Risk and Location in Vietnam			
Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks
Ha Tinh	Huong Son	Northeast	Low-Risk	Ha Tinh	Huong Son	Northeast	Low-Risk	Ha Tinh	Huong Son	Northeast	Low-Risk
Lai Chau	Dien Bien	Northeast	Low-Risk	Yen Bai	Tram Tau	Northeast	Low-Risk	Lai Chau	Dien Bien	Northeast	Low-Risk
Yen Bai	Tram Tau	Northeast	Low-Risk	Lao Cai	Bat Xat	Northeast	High-Risk	Lai Chau	Dien Bien Dong	Northeast	Low-Risk
Lao Cai	Bat Xat	Northeast	Low-Risk	Lao Cai	Than Uyen	Northeast	High-Risk	Yen Bai	Tram Tau	Northeast	Low-Risk
Lao Cai	Bat Xat	Northeast	High-Risk	Lao Cai	Van Ban	Northeast	Moderate-Risk	Lao Cai	Bat Xat	Northeast	High-Risk
Lao Cai	Than Uyen	Northeast	High-Risk	Yen Bai	Mu Cang Chai	Northeast	Low-Risk	Lao Cai	Than Uyen	Northeast	High-Risk
Lao Cai	Van Ban	Northeast	High-Risk	Son La	Muong La	Northeast	Low-Risk	Lao Cai	TX. Cam Duong	Northeast	Low-Risk
Lao Cai	Van Ban	Northeast	Low-Risk	Lao Cai	Van Ban	Northeast	Moderate-Risk	Lao Cai	Sa Pa	Northeast	Low-Risk
Yen Bai	Mu Cang Chai	Northeast	Moderate-Risk	Lao Cai	Than Uyen	Northeast	High-Risk	Lao Cai	Than Uyen	Northeast	High-Risk
Son La	Bac Yen	Northeast	Low-Risk	Lao Cai	Sa Pa	Northeast	High-Risk	Lao Cai	Van Ban	Northeast	Moderate-Risk
Son La	Muong La	Northeast	Moderate-Risk	Lao Cai	Than Uyen	Northeast	High-Risk	Yen Bai	Mu Cang Chai	Northeast	Moderate-Risk
Lao Cai	Than Uyen	Northeast	Low-Risk	Son La	Quynh Nhai	Northeast	Moderate-Risk	Yen Bai	Tram Tau	Northeast	Low-Risk
Lao Cai	Van Ban	Northeast	Moderate-Risk	Son La	Muong La	Northeast	Moderate-Risk	Yen Bai	TX. Nghia Lo	Northeast	Low-Risk
Lao Cai	Than Uyen	Northeast	High-Risk	Lai Chau	Sin Ho	Northeast	Low-Risk	Son La	Bac Yen	Northeast	Low-Risk
Lao Cai	Sa Pa	Northeast	High-Risk	Lao Cai	Than Uyen	Northeast	Low-Risk	Son La	Muong La	Northeast	Moderate-Risk
Lao Cai	Than Uyen	Northeast	High-Risk	Lai Chau	Sin Ho	Northeast	Low-Risk	Lao Cai	Than Uyen	Northeast	Low-Risk
Son La	Quynh Nhai	Northeast	Moderate-Risk	Lai Chau	Phong Tho	Northeast	Low-Risk	Lao Cai	Van Ban	Northeast	Moderate-Risk
Son La	Muong La	Northeast	High-Risk	Lao Cai	Bat Xat	Northeast	Low-Risk	Yen Bai	Mu Cang Chai	Northeast	Low-Risk
Lai Chau	Sin Ho	Northeast	Low-Risk	Lai Chau	Muong Te	Northeast	Low-Risk	Lao Cai	Sa Pa	Northeast	High-Risk
Lao Cai	Than Uyen	Northeast	Low-Risk	Lai Chau	TX. Lai Chau	Northeast	Low-Risk	Lao Cai	Than Uyen	Northeast	High-Risk
Lai Chau	Sin Ho	Northeast	Low-Risk	Lai Chau	Muong Lay	Northeast	Low-Risk	Son La	Quynh Nhai	Northeast	Moderate-Risk
Lai Chau	Phong Tho	Northeast	Low-Risk	Lai Chau	Tuan Giao	Northeast	Low-Risk	Yen Bai	Mu Cang Chai	Northeast	Moderate-Risk
Lao Cai	Bat Xat	Northeast	Moderate-Risk	Son La	TX. Son La	Northeast	Low-Risk	Son La	Muong La	Northeast	Moderate-Risk

Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Lao PDR

Date of FFG product: 07-08-2023 0:00 UTC time

01-Hour Flash Flood Risk and Location					03-Hour Flash Flood Risk and Location					06-Hour Flash Flood Risk and Location				
Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk
Xiengkhuang	Khoune	LATHONG	Northwest	High-Risk	Xaysomboun	Thathom		Northwest	Low-Risk	Bolikhamxay	Viengthor	SOBSOF	Northwes	Low-Risk
Xiengkhuang	Souy		Northwest	Low-Risk	Xaysomboun	Xaysomboı	THALO	Northwest	Low-Risk	Bolikhamxay	Khamkheut		Northwes	Low-Risk
Xaysomboun	Thathom		Northwest	Moderate-Risk	Xaysomboun	Xaysomboı	MOUANG OM	Northwest	Low-Risk	Bolikhamxay	Khamkhe	KOKPHO	Northwes	Low-Risk
Xaysomboun	Thathom		Northwest	Low-Risk	Xaysomboun	Thathom	PHUPHA	Northwest	Low-Risk	Bolikhamxay	Khamkheut		Northwes	Low-Risk
Xaysomboun	Xaysombou	THALO	Northwest	Low-Risk	Bolikhamxay	Pakxanh		Northwest	Low-Risk	Bolikhamxay	Khamkhe	NAMGN	Northwes	Low-Risk
Xaysomboun	Xaysombou	MOUANG OM	Northwest	Low-Risk	Xaysomboun	Hom		Northwest	Low-Risk	Bolikhamxay	Khamkheut		Northwes	Low-Risk
Xaysomboun	Thathom	PHUPHA	Northwest	Low-Risk	Bolikhamxay	Thaphabat		Northwest	Low-Risk	Bolikhamxay	Khamkhe	PHONKH	Northwes	Low-Risk
Bolikhamxay	Pakxanh		Northwest	Low-Risk	Vientiane	Thoulakho	NONGPONG NEUA	Northwest	Low-Risk	Bolikhamxay	Khamkhe	KENGKU	Northwes	Low-Risk
Bolikhamxay	Thaphabat		Northwest	Low-Risk	Vientiane Mur	Xaythany		Northwest	Low-Risk	Bolikhamxay	Thaphabat		Northwes	Moderate-Risk
Xaysomboun	Hom		Northwest	Moderate-Risk	Xaysomboun	Phoun	PHONEXAI	Northwest	Low-Risk	Xaysomboun	Thathom	NAMXAI	Northwes	Low-Risk
Bolikhamxay	Thaphabat		Northwest	Moderate-Risk	Vientiane	Vangvieng		Northwest	Low-Risk	Xiengkhuang	Souy	PHA TAI	Northwes	Low-Risk
Vientiane	Thoulakho	NONGPONG NEUA	Northwest	Moderate-Risk	Xaysomboun	Phoun		Northwest	Low-Risk	Xiengkhuang	Souy		Northwes	Moderate-Risk
Vientiane Municipality	Xaythany		Northwest	Low-Risk	Xaysomboun	Phoun		Northwest	Low-Risk	Xaysomboun	Xaysombou		Northwes	Moderate-Risk
Xaysomboun	Phoun	PHADAENG TAI	Northwest	Low-Risk	Xiengkhuang	Pek		Northwest	Low-Risk	Xiengkhuang	Khoune	LATHON	Northwes	Moderate-Risk
Xaysomboun	Phoun		Northwest	Low-Risk	Xiengkhuang	Phookood		Northwest	Low-Risk	Xiengkhuang	Souy		Northwes	Low-Risk
Xaysomboun	Phoun	PHONEXAI	Northwest	Moderate-Risk	Xiengkhuang	Pek		Northwest	Low-Risk	Xaysomboun	Thathom		Northwes	Moderate-Risk
Vientiane	Vangvieng		Northwest	Moderate-Risk	Xaysomboun	Xaysombou		Northwest	Moderate-Risk	Xaysomboun	Thathom		Northwes	Low-Risk
Vientiane	Vangvieng		Northwest	Low-Risk	Xaysomboun	Xaysombou		Northwest	Moderate-Risk	Xaysomboun	Xaysomb	THALO	Northwes	Low-Risk
Xaysomboun	Phoun		Northwest	Moderate-Risk	Xaysomboun	Xaysombou		Northwest	Moderate-Risk	Xaysomboun	Xaysomb	MOUAN	Northwes	Low-Risk
Vientiane	Kasy		Northwest	Low-Risk	Xaysomboun	Xaysombou		Northwest	Low-Risk	Xaysomboun	Thathom	PHUPHA	Northwes	Low-Risk
Xaysomboun	Phoun		Northwest	Moderate-Risk	Xaysomboun	Xaysombou	PHOUHUAXANG	Northwest	Low-Risk	Xaysomboun	Thathom	LAK 37	Northwes	Low-Risk

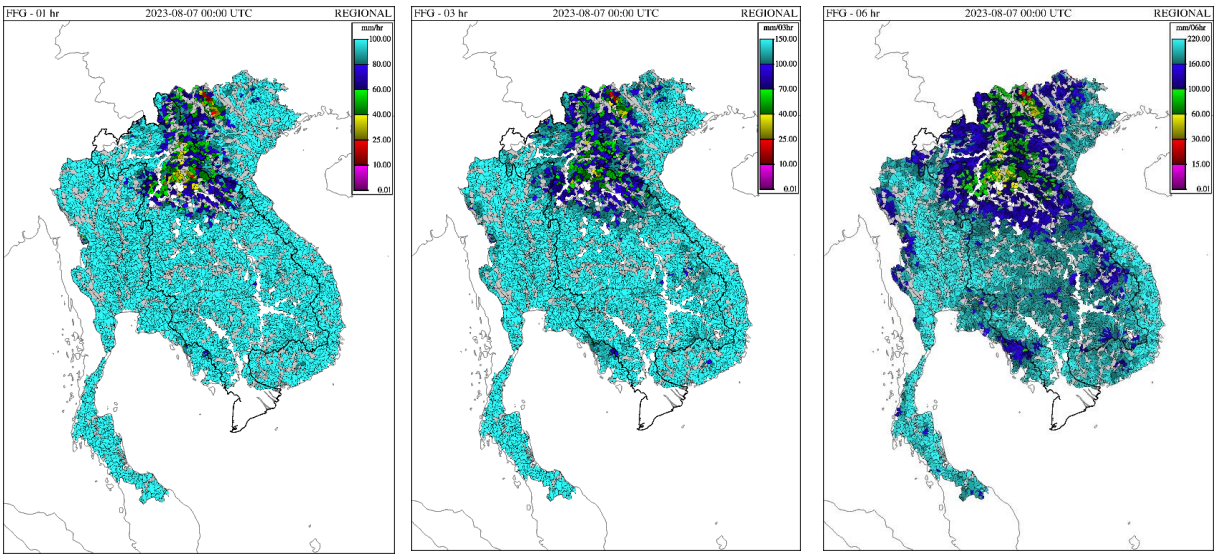


Figure 14. Flash Flood Guidance for the next 1-hr, 3-hr and 6-hr on August 07

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from 31 July to 6 August 2023

Drought monitoring data in 2023 are available from Monday to Sunday every week; thus, the reporting period is normally delayed by two days compared to Flood and Flash Flood reports. We adopt the Index of Soil Water Fraction (ISWF) data obtained from FFGS to represent soil moisture of agricultural indicator for both dry and wet seasons.

- **Weekly Standardised Precipitation Index (SPI1)**

The meteorological drought indicator of SPI from Jul 31 to Aug 6, as displayed in Figure 15, shows that the LMB was at moderately and severely dry over mainly the northern and southern parts of the LMB. The impacted areas are listed in the table below.

No.	Country	Province	Drought status		
			Moderate	Severe	Extreme
1		Battambang	Yes		
2		Phnom Penh	Yes	Yes	
3		Pursat	Yes	Yes	
4		Preah Vihear	Yes	Yes	
5		Stung Treng	Yes	Yes	
6		Kampot	Yes		
7		Kampong Thom	Yes		
8		Kampong Speu	Yes	Yes	
9		Prey Veng	Yes	Yes	
10		Kandal	Yes	Yes	
11		Koh Kong	Yes	Yes	
12		Luangnamtha	Yes	Yes	Yes
13		Phongsaly	Yes		
14		Bokeo	Yes	Yes	
15		Luang Prabang	Yes	Yes	
16		Xiengkhuang	Yes		
17		Xayaburi	Yes		
18		Borikhamxay	Yes		
19		Vientiane	Yes		
20		Xaysomboun	Yes		
21		Oudomxay	Yes	Yes	
22		Sekong	Yes		
23		Chiang Rai	Yes	Yes	
24		Phayao	Yes		
25		An Giang	Yes	Yes	
26		Tien Giang	Yes		
27		Tra Vinh	Yes		
28		Ben Tre	Yes		

Drought Legend: Moderate | Severe | Extreme

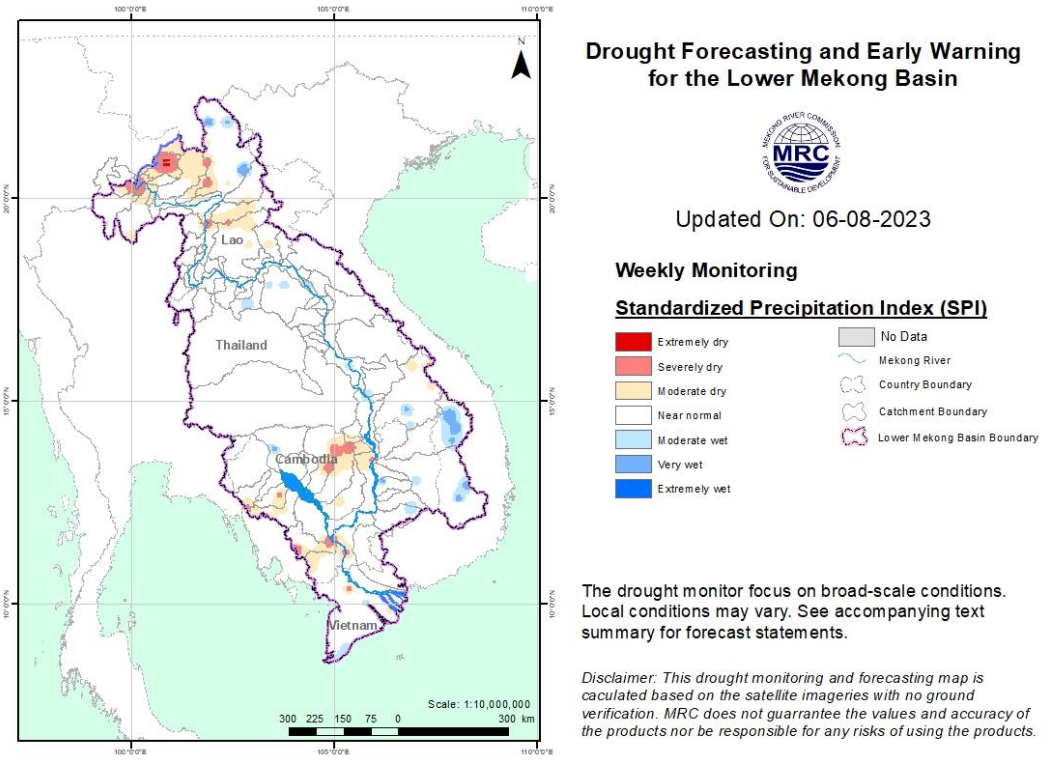


Figure 15. Weekly standardized precipitation index from 31 July to 6 August 2023.

- **Weekly Index of Soil Water Fraction (ISWF)**

For the agricultural indicator, the nowcast this week from Jul 31 to Aug 6 indicates that the region did not face any agricultural drought threat during the monitoring week. Figure 16 of weekly ISWF shows that most parts of the LMB were normal and wet.

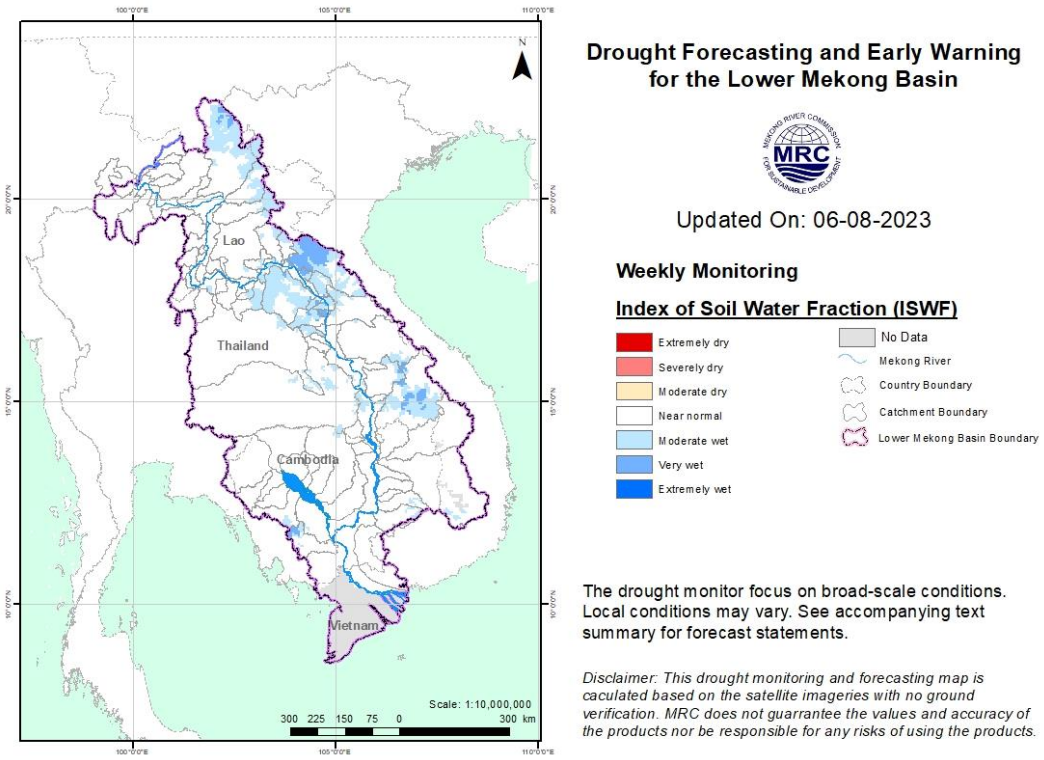


Figure 16. Index of Soil Water Fraction from 31 July to 6 August 2023.

- **Weekly Combined Drought Index (CDI)**

The combined drought indicator from the meteorological and agricultural indices from July 31 to August 6, as displayed in Figure 17, shows that some moderate droughts were detected in Cambodia and Laos. Other areas were normal.

No.	Country	Province	Drought status			
			Moderate	Severe	Extreme	Except.
1		Preah Vihear	Yes			
2		Pursat	Yes			
3		Kandal	Yes			
4		Prey Veng	Yes			
5		Phnom Penh	Yes			
6		Luangnamtha	Yes			
7		Sekong	Yes			

Drought Legend: Moderate | Severe | Extreme | Exceptional

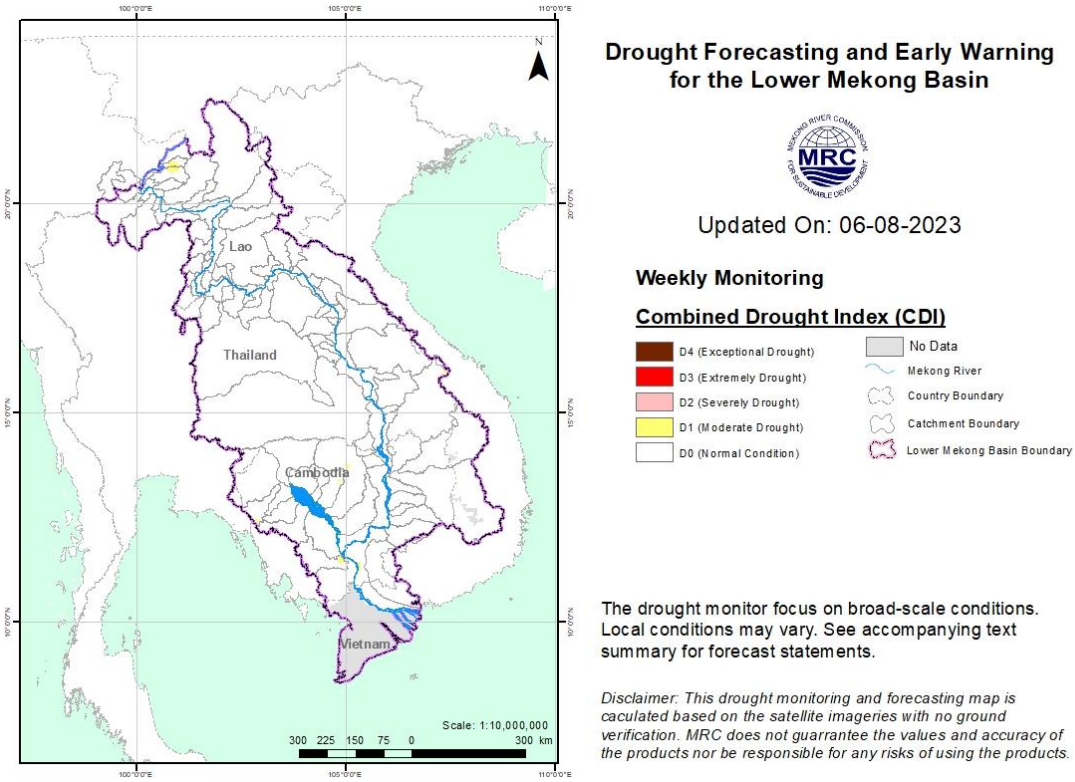


Figure 17. Weekly Combined Drought Index from 31 July to 6 August 2023.

More information on Drought Forecasting and Early Warning (DFEW) as well as the explanation is available here: http://droughtforecast.mrcmekong.org/templates/view/our-product. DFEW provides not only weekly monitoring and forecasting information but also a three-month forecast of drought indicators with seasonal outlook which are updated every

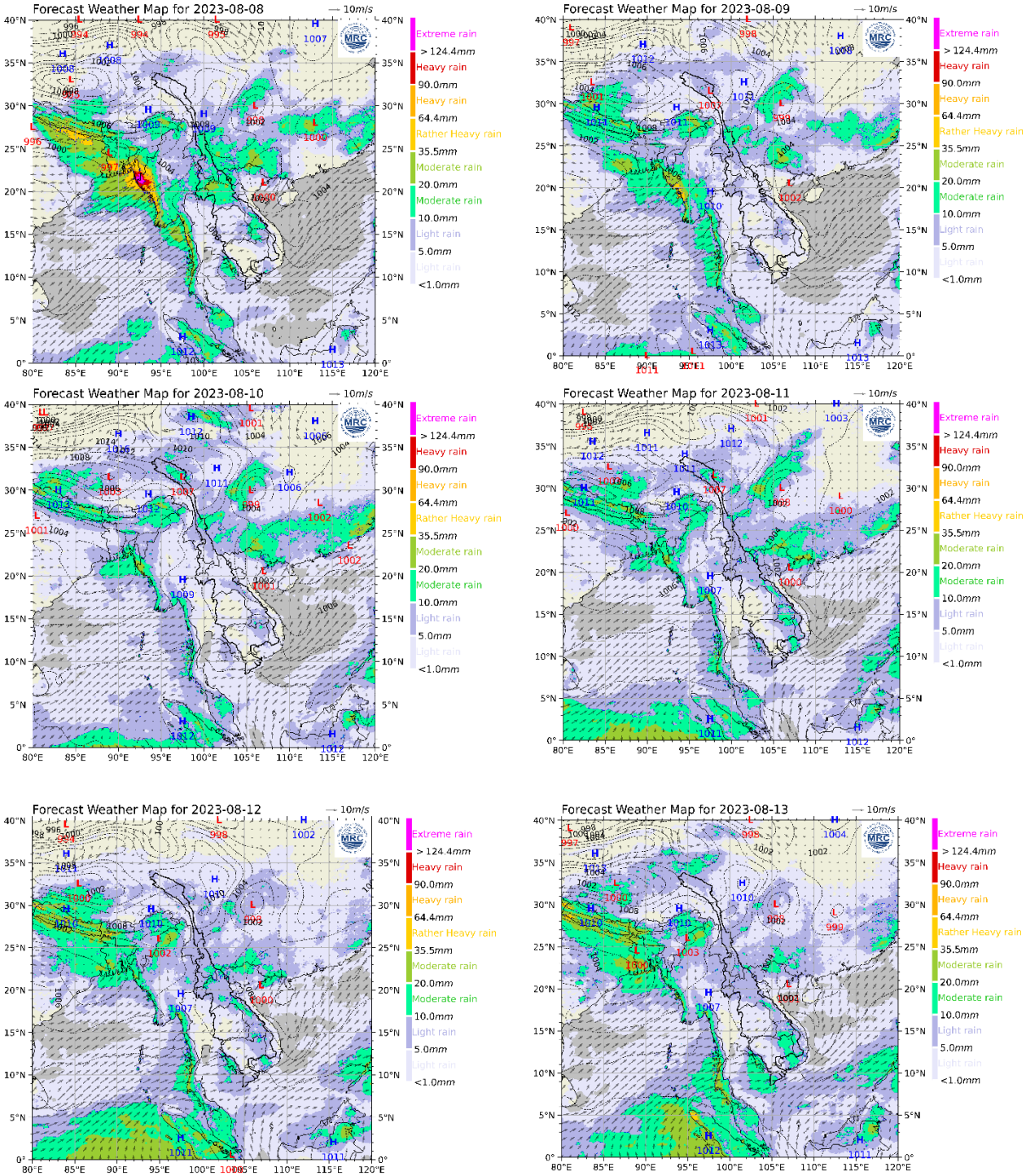
month based on international weather forecast models. Details on drought forecast are described in section 6.4 of this report.

6 Weather and Water Level Forecast and Flash Flood Information

6.1 Weather and rainfall forecast

During August 08-14, based on result from the CHIRPS-GEFS, which merges observations from the Climate Hazards Group Infrared Precipitation with Stations (CHIRPS) data set with the Global Ensemble Forecast System (GEFS), small to heavy rain (5-70 mm/24h) is forecasted for the LMB area.

Figure 18 shows accumulated rainfall forecast (24h) of the forecasting model using CHIRPS-GEFS data from August 08 to 14.



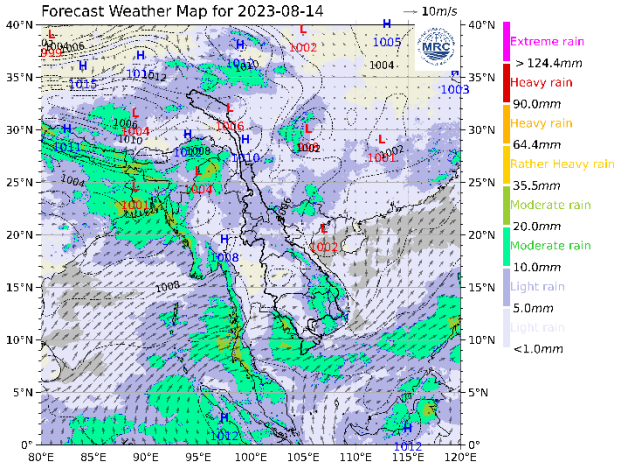


Figure 18. Accumulated rainfall forecast (24 h) based on the forecasting model using CHIRPS-GEFS data.

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on August 7's daily flood forecasting bulletin, the daily forecasted water level at Chiang Saen in Thailand shows an increase of water level from 4.90 m and 5.30 m over the next five days. The trend will keep the water level at this station lower than its LTA.

For Luang Prabang in Lao PDR, the water level will increase about 1.77 m during the next five days. The current water level is lower than its LTA. Precipitation is forecasted for the area between Chiang Saen and Luang Prabang next week.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand is forecasted to go up approximately 1.97 m, while water level at Vientiane in Lao PDR will increase about 2.73 m. Furthermore, in Nong Khai of Thailand the water level will increase about 3.17 m over the next five days; at Paksane in Lao PDR water level will increase about 2.47 m due to forecasted heavy rainfalls and dam operation in the upper catchments. Rainfall is forecasted for the area of Paksane next week. The water levels at these stations will stay higher than their LTA value.

Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR are forecasted to go up from 0.45 m to 2.13 m, because of above-average rainfall predicted in these areas. However, water level at these stations will stay lower than their LTA level. Rainfall is forecasted for the area next week.

Stung Treng to Kompong Cham/Phnom Penh to Koh Khel/Neak Luong

WL at Stung Treng and Kratie in Cambodia will go down between 0.21 m and 0.75 m, while at Kompong Cham along the Mekong River the water level will go down about 0.65 m over the

next five days. Precipitation is forecasted for the area between Stung Treng and Kompong Cham during next week.

The water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port as well as at Phnom Penh's Chaktomuk on the Bassac River will go down between 0.14 m and 0.40 m over the next five days.

Water levels at most of the stations will go up and down during next week. WLs at most stations will be still staying higher than their LTA value. From Vientiane to Luang Prabang, Chiang Khan, Vientiane, Nong Khai, Paksane and from Nakhon Phanom to Pakse, the water level will be rising and WLs at most stations will be staying higher than their LTA value. Precipitation is forecasted for the low-lying area of Cambodia next week.

Tidal stations at Tan Chau and Chau Doc

For Viet Nam's Tan Chau on the Mekong River and Chau Doc on the Bassac River, the water levels will be staying lower than their LTA level, following daily tidal effects from the sea. Rainfall is forecasted for the Mekong Delta area next week.

The performance of the weekly flood forecast, with an accuracy and data input evaluation from 1 to 7 August 2023, is presented in **Annex 1**.

Table 2 shows the daily flood forecasting Bulletin issued on 7 August 2023. Results of the weekly river monitoring bulletin are also available at http://ffw.mrcmekong.org/bulletin_wet.php.

6.3 Flash Flood Information

With small to heavy rain for next week, flash floods might be detected in some areas in the LMB. And local heavy rain in a short period of time is possible with unpredictable short flash floods.

Detailed information on Flash Flood Warning Information as well as its explanation is available for download here.

6.4 Drought forecast

There are several climate-prediction models with different scenarios in the upcoming months until August 2023. The MRC's DFEWS adopts an ensemble model called the North America Multi-Model Ensemble (NMME), which averages all scenarios, and downscales the forecasts to the regional level. The Variable Infiltration Capability (VIC) is then used to generate soil moisture and runoff for the whole basin.

Figure 19 below shows the Combine Drought Indicator (CDI) forecast for July, August, and September 2023. CDI is a combination of meteorological and agricultural indicators.

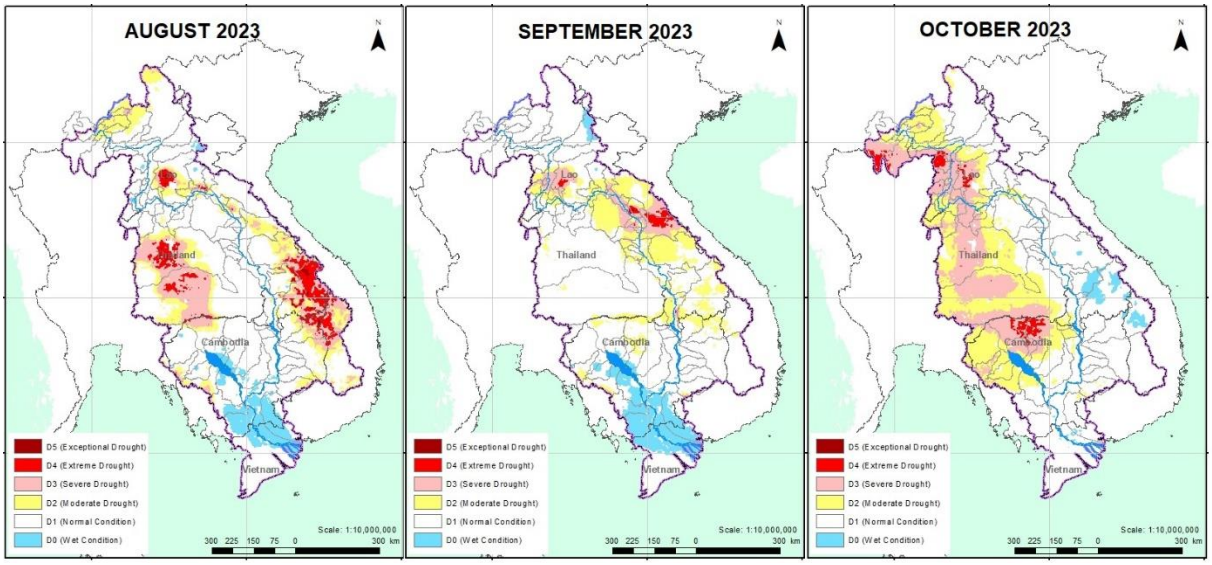


Figure 19. Monthly forecast of CDI for July, August, and September 2023.

Figure 19 above shows that **August** is expected to be moderately dry in the upper north, severely and extremely dry in the west covering mainly Thailand, and extremely dry in the south-east covering southern Laos and 3S areas. In **September**, Xayaburi, Vientiane and Luang Prabang of northern Laos are likely to be hit by moderate drought, while central Laos in the eastern LMB is likely to be facing some moderate and severely droughts. In **October**, moderate and severe droughts are forecasted for the north-west, west, and south-west areas of the LMB covering some areas of northern Laos, Thailand, and north-western Cambodia. Most parts of Laos and Vietnam are likely not at any risk.

Table 2. Weekly River Monitoring Bulletin.

Mekong Bulletin

Mekong River Commission Secretariat (MRCS)

Regional Flood and Drought Management Centre (RFDMC)

P.O. Box 623 #576, National Road #2, Chak Angre Krom, Meanchey, Phnom Penh, Cambodia

Tel: (855-23) 425353, Fax: (855-23) 425363, Email: floodforecast@mrcmekong.org

River Flood Forecast: 08 Aug - 12 Aug 2023

Date: 07 August 2023

Location	Country	24-hr Observed Rainfall (mm)	Zero gauge above M.S.L (m)	Flood level (m)	Alarm level (m)	Observed W. level against zero gauge (m)		Forecasted Water Levels (m)					There is currently no flood warning in place at monitoring sites on the Mekong					
		06-Aug				06-Aug	07-Aug	08-Aug	09-Aug	10-Aug	11-Aug	12-Aug	07	08	09	10	11	12
Jinghong		27.5				537.52	537.52							×	×	×	×	×
Chiang Saen		40.7	357.110	12.80	11.50	4.51	4.90	5.25	5.30	5.42	5.50	5.30	↑	↑		↑		↓
Luang Prabang		70.0	267.195	18.00	17.50	12.48	13.68	14.60	15.10	15.20	15.35	15.45	↑	↑	↑		↑	
Chiang Khan		12.0	194.118	16.00	14.50	10.05	10.78	11.60	12.23	12.58	12.65	12.75	↑	↑	↑	↑		
Vientiane		nr	158.040	12.50	11.50	5.75	7.60	8.36	9.20	9.86	10.24	10.33	↑	↑	↑	↑	↑	
Nongkhai		12.3	153.648	12.20	11.40	5.55	7.15	8.72	9.45	10.03	10.28	10.32	↑	↑	↑	↑	↑	
Paksane		20.1	142.125	14.50	13.50	7.93	8.10	8.93	9.70	10.13	10.45	10.57	↑	↑	↑	↑	↑	↑
Nakhon Phanom		4.7	130.961	12.00	11.50	9.20	9.32	9.41	10.14	10.85	11.20	11.43	↑		↑	↑	↑	↑
Thakhek		4.5	129.629	14.00	13.00	9.81	9.92	10.02	10.75	11.46	11.82	12.05	↑	↑	↑	↑	↑	↑
Mukdahan		0.5	124.219	12.50	12.00	8.86	8.96	9.02	9.06	9.50	9.90	10.12	↑			↑	↑	↑
Savannakhet		nr	125.410	13.00	12.00	7.25	7.37	7.39	7.41	7.63	7.81	7.93	↑			↑	↑	↑
Khong Chiam		4.5	89.030	14.50	13.50	10.73	10.70	10.75	10.78	10.80	11.13	11.50					↑	↑
Pakse		10.0	86.490	12.00	11.00	8.80	8.75	8.76	8.78	8.80	8.97	9.20	↓				↑	↑
Stung Treng		4.5	36.790	12.00	10.70	8.60	8.35	8.20	8.10	8.07	8.02	8.14	↓	↓	↓		↓	↑
Kratie		10.9	-0.101	23.00	22.00	18.86	18.56	18.27	18.10	17.96	17.90	17.81	↓	↓	↓	↓	↓	↓
Kompong Cham		nr	-0.930	16.20	15.20	12.08	11.96	11.70	11.54	11.45	11.35	11.31	↓	↓	↓	↓	↓	↓
Phnom Penh (Bassac)		nr	-1.020	12.00	10.50	7.17	7.15	7.05	6.96	6.92	6.87	6.85		↓	↓	↓	↓	
Phnom Penh Port		-	0.070	11.00	9.50	5.88	5.96	5.90	5.85	5.83	5.80	5.80	↑	↓	↓		↓	
Koh Khel (Bassac)		nr	-1.000	8.40	7.90	6.64	6.55	6.47	6.36	6.29	6.20	6.15	↓	↓	↓	↓	↓	↓
Neak Luong		nr	-0.330	8.00	7.50	5.10	5.09	5.02	4.91	4.83	4.80	4.75		↓	↓	↓	↓	↓
Prek Kdam		nr	0.080	10.00	9.50	5.71	5.72	5.68	5.64	5.62	5.60	5.58		↓	↓			
Tan Chau		0.0	0.000	4.50	3.50	1.79	1.83	1.85	1.82	1.76	1.70	1.70	↑		↓	↓	↓	
Chau Doc		nr	0.000	4.00	3.00	1.45	1.48	1.52	1.50	1.44	1.37	1.32	↑	↑		↓	↓	↓

REMARKS:

-: not available.

nr: no rain.

LEGEND	
rising water level	↑
stable water level	
falling water level	↓
alarm stage	
alarm situation	
flood stage	
no data available	×

Note: Stable water level is defined as a daily change of less than 10cm from Chiang Saen to Savannakhet; less than 5cm at Pakse and Stung Treng; and no more than 3cm cm from Kratie downstream.
Flood stage is when the flood level exceeds. A flood level is determined by each Member Country.
Alarm stage is when the water level ranges between alarm and flood levels.
Alarm situation is when the water level is forecasted to reach the flood stage within the next three days.

River Flood Forecaster

KHEM Sothea

NOTE: Discharge at Luang Prabang may be influenced by hydropower operations (at both upstream and downstream).
For more info, please refer to this link:
http://www.mrcmekong.org/; http://ffw.mrcmekong.org/bulletin_wet.php; http://ffw.mrcmekong.org/reportflood.php

7 Summary and Possible Implications

7.1 Rainfall and its forecast

Rain was observed from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam during August 1-7, including the lower part in Lao PDR and Cambodia, varying from 0.50 mm to 434.50 mm due to the low pressure covered the LMB during the report period. This week rainfall was considered high in the LMB compared with last week rainfall.

Based on the forecasted satellite data, rainfall is forecasted for some areas of the LMB with the value range from 30.00 mm to 140.00 mm for the next seven days. The forecasting model using CHIRPS-GEFS data, moreover, shows significant rainfall (>150 mm) is likely to take place in the Mekong region from 09 to 15 August 2023.

7.2 Water level and its forecast

According to MRC's observed water level at Jinghong, it showed fluctuated water levels from 537.15 m to 538.20 m during 1-7 August 2023**.** The current level is staying about 1.08 m higher than its LTA value. The outflow at Jinghong station varied between 2,290.00m^3/s and 3,220.00 m^3/s between 1 and 7 August 2023.

With the fluctuated outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen increased 0.85 m from 1 to 7 August 2023. Moreover, at Chiang Khan the water level increased about 3.18 m, while at Valentine and Nong Khai it increased between 3.00 m and 3.07 m due to the influence of dam operation upstream and rainfall. Water levels from Nakhon Phanom to Pakse rapidly increased between 2.52 m and 3.42 m. The current WLs at these stations at Nakhon Phanom, Khong Chiam and Paske are staying higher than their LTA level, **considered normal**. From the stretches of the river at Stung Treng, WL increased 1.27 m and stayed about 0.29 m higher than its LTA, while at Kratie water level was up about 2.92 m, staying 0.89 m higher than its LTA level, due to the contributed rainfall from upstream part including Pakse and 3S area in Viet Nam.

The flow volume of the Tonle Sap Lake is lower than its LTA (about 50%) up to August 7. From next week, the flow is expected to increase due to average rainfall forecasted in the inflow catchments of the Tonle Sap Lake.

From Stung Treng to Kratie and Kompong Cham on the Mekong River, the water levels are expected to decrease between 0.21 m and 0.75 m and will still remaining slightly higher than their LTA value for the next 5 days. The water levels – at Prek Kdam to Phnom Penh Port on the Tonle Sap, and Chaktomuk to Koh Khel on the Bassac – are forecasted to increase but still stay lower than their LTA value.

The situation in Tan Chau on the Mekong River and Chau Doc on the Bassac River is expected to remain unchanged.

Since the third week of September 2022, water levels across most monitoring stations in the LMB have increased due to the above-average rainfall but still staying lower than their LTA

value (from middle to lower stretches within the LMB). The preliminary analysis of the hydrological conditions in the LMB over July–December 2020 and November 2020 to May 2021 was done as Situation Report, which can be used as reference for the trend of water level and flows of the Mekong River Basin.

The contribution to the Mekong River's flow from the UMB in China (Yunnan component) is about 16% by the time the river discharges through the Mekong Delta into the Sea. By far the major contribution comes from the two major 'left-bank' (Eastern) tributaries between Vientiane – Nakhon Phanom and Pakse – Stung Treng, which together contribute more than 40% of the flows.

7.3 Flash flood and its trends

With the predicted amount of rainfall for the coming week as mentioned earlier in section 6.1, flash floods are likely to be detected in some areas of the LMB during next week.

7.4 Drought condition and its forecast

During July 31-Aug 6, some moderate droughts were detected in Cambodia and Laos covering some area of Prhea Vihear, Pursat, Kandal, Prey Veng, Phnom Penh, Luangnamtha, and Sekong. Other areas were normal.

The three-month forecast shows that **August** is expected to be moderately dry in the upper north, severely and extremely dry in the west covering mainly Thailand, and extremely dry in the south-east covering southern Laos and 3S areas. In **September**, Xayaburi, Vientiane and Luang Prabang of northern Laos are likely to be hit by moderate drought, while central Laos in the eastern LMB is likely to be facing some moderate and severely droughts. In **October**, moderate and severe droughts are forecasted for the north-west, west, and south-west areas of the LMB covering some areas of northern Laos, Thailand, and north-western Cambodia. Most parts of Laos and Vietnam are likely not at any risk.

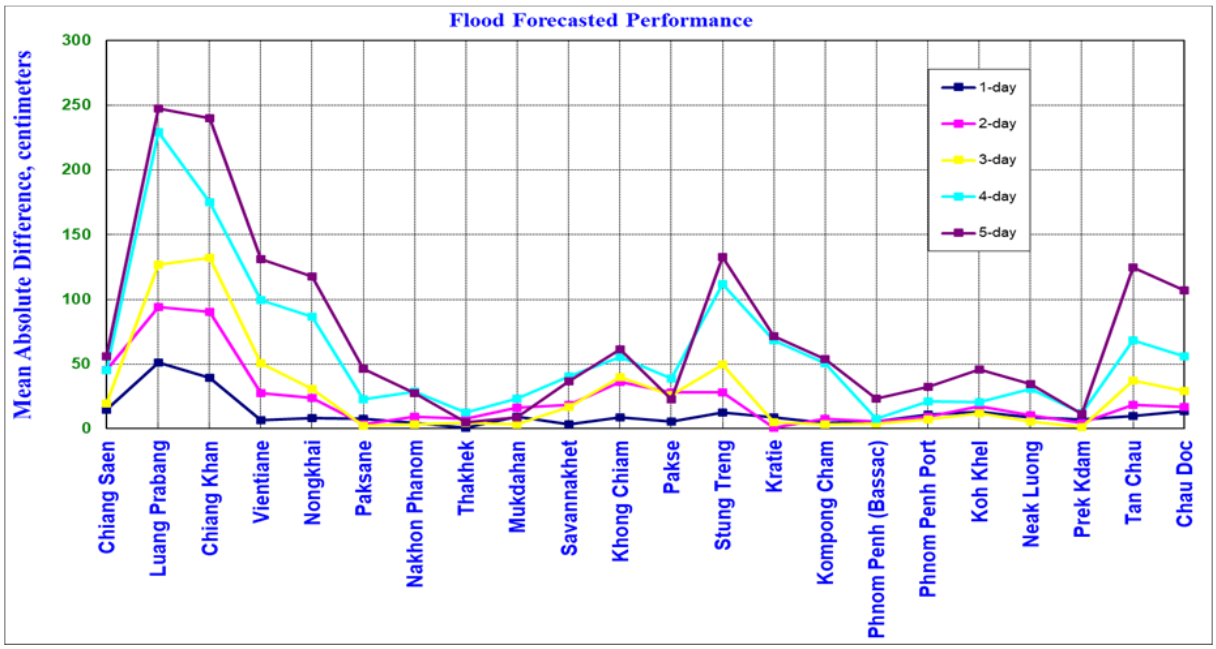
Annex 1: Performance of the weekly flood forecasting

Accuracy

"Accuracy" here refers to the state where data recorded in the MRC's Mekong River Flood Forecasting System are cleaned and verified.

The adjustment of flood forecasting outcomes from the flood forecasting system requires flood forecasters to have extensive knowledge in hydrology and statistical modelling for estimating the relationships between stations upstream and downstream in the Mekong River Basin. Flood forecasting performance presented in the graph below shows the average flood forecasting accuracy at each key station along the Mekong mainstream from 1 to 7 August 2023.

The forecasting values from 1 to 7 August 2023 show that the overall accuracy is fair for a four-day to five-day forecast in lead time (less than 250 cm) for most of the stations from the upper to the lower parts of the Mekong River with combine information of rainfall and reservoirs' operation in this area during the report period.



Note: The higher percentage of flood forecasting accuracy is due to several key factors as follows:

- Missing rainfall in Cambodia (DOM) data and data input are not sufficient to be used for inputting into the flood forecasting model system.
- Chiang Saen station is influencing by hydropower upstream operation from China.
- Luang Prabang to Chiang Khan and Paksane to Stung Treng to Kratie have been influenced by hydropower operations upstream, tributaries inflows.
- The influence of heavy rainfall caused by storms and hydropower operations from upstream, tributaries inflows and the lower part of the Mekong floodplain, including the 3S (Stung Treng and Kratie).

- Fluctuations of the water levels at Tan Chau and Chau Doc stations were due to daily tidal effects of the sea in the Mekong Delta.
- Satellite rainfall data were not representative of the actual rainfall at ground stations in some areas of the Mekong region.

Performance based on data from the Member Countries

Flood forecasting performance is based on the hydro-met data received from the Member Countries. The flood forecasting achievement indicated in (%) and (cm) from 1 day to 5 days at each key station, against with Old Benchmark are presented in Table B1 and Table B2.

The evaluation of performance indicators, missing data and completion time for flood forecasting are presented in Table B3 and Figures B4, B5 and B6, respectively from 1 to 7 August 2023.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 1 to 7 August 2023 in cm

Lead-time Forecasted	Chlang Saen	Luang Prabang	Chlang Khan	Vientlane	Nongkhal	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chlam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	15	51	39	7	8	8	4	1	9	3	9	6	13	9	4	6	11	13	9	7	10	13
2-day	45	94	90	28	24	3	9	8	16	18	36	28	28	1	8	6	9	18	10	5	18	17
3-day	20	127	132	50	31	2	3	5	4	17	40	26	50	5	4	4	7	12	6	1	37	29
4-day	45	229	175	100	86	22	29	13	23	41	56	39	112	68	50	8	21	21	31	12	68	56
5-day	56	248	240	131	118	46	28	5	9	37	61	23	133	71	54	23	32	46	35	12	125	107

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 1 to 7 August 2023 in %

Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	*Average*
1-day	57.1	42.9	57.1	14.3	42.9	0.0	14.3	14.3	42.9	28.6	28.6	14.3	14.3	71.4	28.6	57.1	71.4	71.4	85.7	71.4	85.7	57.1	***44.2***
2-day	83.3	50.0	50.0	66.7	66.7	33.3	50.0	50.0	16.7	33.3	50.0	16.7	66.7	0.0	16.7	33.3	0.0	33.3	33.3	16.7	66.7	66.7	***40.9***
3-day	60.0	20.0	40.0	60.0	60.0	0.0	20.0	0.0	0.0	20.0	20.0	0.0	60.0	20.0	0.0	20.0	0.0	40.0	0.0	0.0	40.0	60.0	***24.5***
4-day	75.0	50.0	25.0	50.0	50.0	50.0	25.0	0.0	0.0	25.0	25.0	0.0	50.0	25.0	25.0	0.0	50.0	50.0	50.0	50.0	25.0	50.0	***34.1***
5-day	66.7	33.3	33.3	33.3	33.3	0.0	33.3	0.0	0.0	0.0	0.0	33.3	33.3	33.3	33.3	33.3	33.3	66.7	33.3	33.3	33.3	66.7	***30.3***

Table B3: Overview of performance indicators for the past 7 days from 1 to 7 August 2023

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
2023	FF completed and sent (time)	Stations without forecast	FF2 completed and sent (time)	Weather data available (time)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - SRHMC	Viet Nam - HMS	NOAA data/2dataset	China/2	Cambodia - DHRW/15	Cambodia - DOM/34	Lao PDR - DMH/25	Thailand - DWR/13	Viet Nam - SRHMC/6	Viet Nam - HMS/39
week	*10:42*	*#DIV/0!*	-	-	*08:15*	*07:10*	*07:13*	*09:42*	*08:56*	*08:44*	*07:05*	*08:28*	*0*	*0*	*0*	*8*	*8*	*0*	*0*	*0*
month	*10:40*	*#DIV/0!*	-	-	*08:15*	*07:10*	*07:26*	*09:58*	*08:43*	*08:31*	*07:12*	*08:28*	*0*	*0*	*238*	*36*	*34*	*0*	*0*	*61*

Fig. B4: Data delivery times for the past 7 days from 1 to 7 August 2023

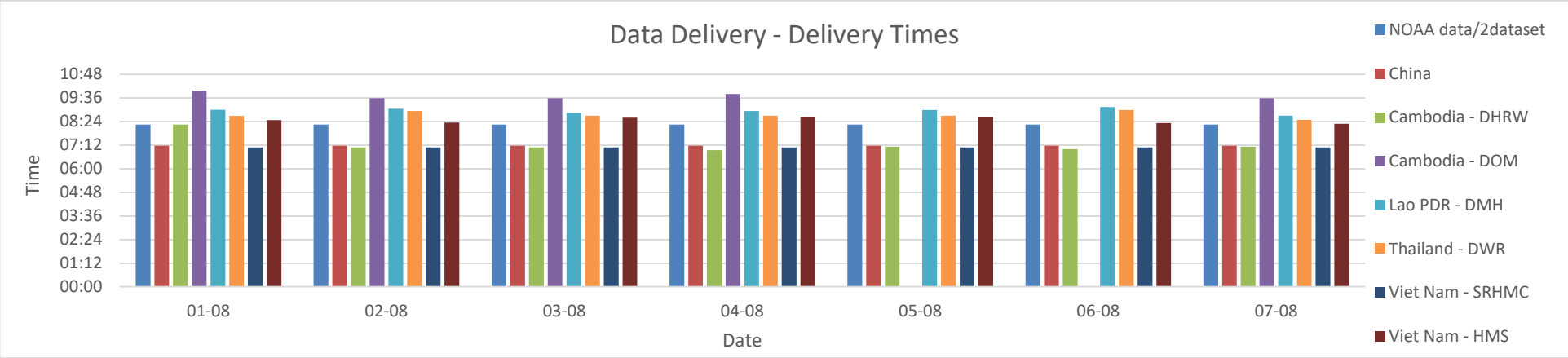


Fig. B5: Missing data for the past 7 days from 1 to 7 August 2023

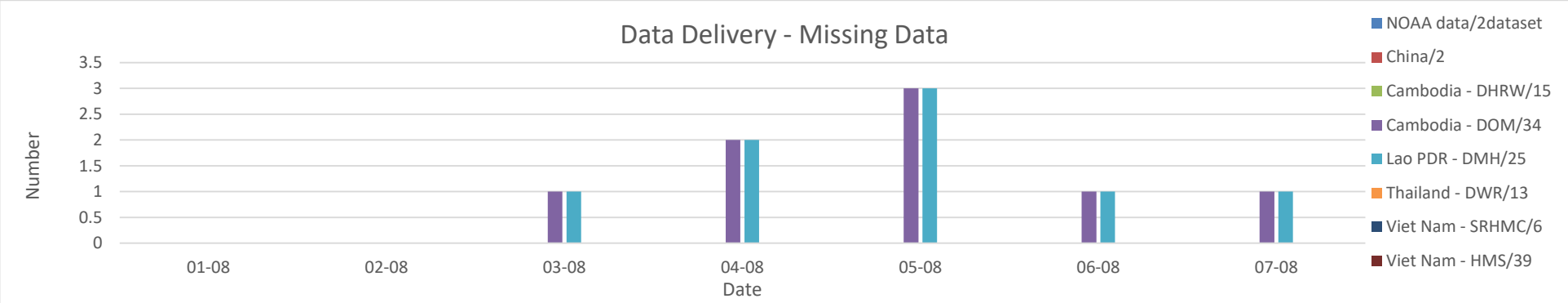
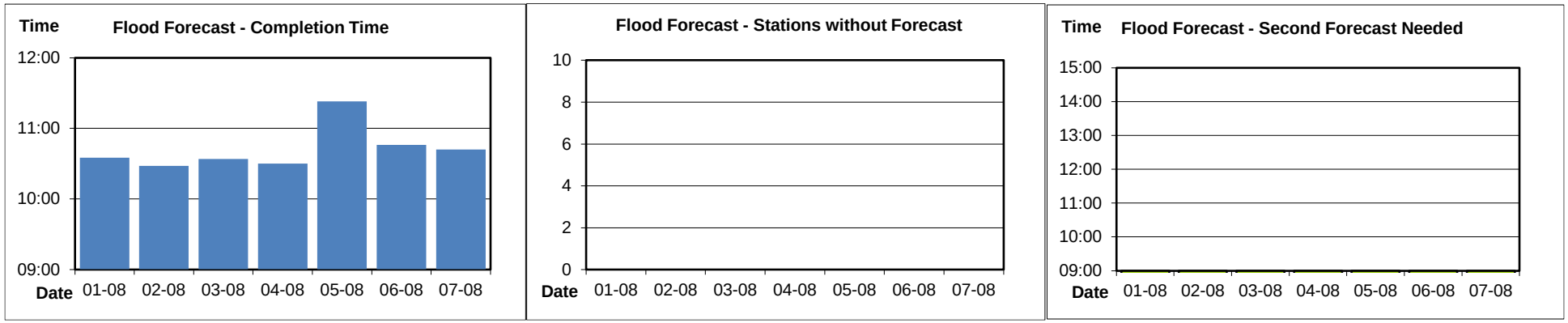


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 1 to 7 August 2023



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