Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin

10-16 October 2023

Prepared by
The Regional Flood and Drought Management Centre
17 October 2023

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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 6.90 millimetres (mm) to 190.00 mm.

- There will be average to heavy rainfall for the next 5 days over the Mekong region from 17 to 21 October 2023 since there will be was influenced by ITCZ band sifting southward and northeasterly wind from China with active tropical disturbance from western Pacific toward the Mekong region.

Water level and its forecast

- According to MRC's observed water level at Jinghong, it showed fluctuating water levels between 535.79 m and 536.53 m during 10-16 October 2023. The current level is staying about 0.14 m higher than its LTA value. The outflow at Jinghong station varied between 1,210.00 m^3/s and 1,770.00 m^3/s between 10 and 16 October 2023.

- With the fluctuated outflow from Jinghong upstream and rainfall at catchment inflow, water levels of monitoring stations at Chiang Saen in Thailand decreased about 0.42 m from 10 to 16 October 2023, staying about 1.08 m lower than its LTA level. Water level at Xieng Kok upstream of Chiang Saen decreased about 1.67 m.

- Water level at Chiang Khan in Thailand from 10 to 16 October 2023 decreased about 0.53 m and stayed about 0.32 m lower than its LTA value, while water level at Vientiane decreased about 0.62 m staying about 0.83 higher than its LTA level. Water levels at Nong Khai decreased 0.43 m and stayed about 0.02 m lower than its LTA, while at Paksane it decreased about 0.67 m, staying about 0.12 m higher than its LTA value. Water levels at these stations are considered normal.

- Water levels from Nakhon Phanom to Pakse decreased from 1.06 m to 1.68 m, due to the contribution of low rainfalls and inflows from upstream. The current WLs at these stations are staying higher than their LTA value, considering normal.

- From the stretches of the river at Stung Treng, water levels decreased about 0.91 m and stayed 0.55 m higher than its LTA values, while at Kratie the water levels decreased about 1.41 m and stayed 1.31 m higher than their LTA values, which were considered normal. Water level at Kompong Cham is about 0.24 m higher than its LTA value.

- The water volume of the Tonle Sap Lake was lower than its LTA (about 76%) during the same period from 10 to 16 October 2023, which is considered low.

- Water levels from downstream at Chaktomuk and Phnom Penh Port, Koh Khel on the Bassac river in Cambodia increased between 0.015 m and 0.10 m, staying lower than their LTA level excepted at Kho Khel the water level is stayed higher than its LTA level. Water levels at Prek Kdam on the Tonle Sap River increased about 0.10 m, staying 0.70 m lower than its LTA value.

- The current water levels for some 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 Stung Treng and Kratie will go down due to average rainfall and dam/reservoir operations upstream, while at downstream from Phnom Penh down to the Mekong floodplain area they are also going to fall.

Drought condition and its forecast

- During **Oct 9 to 15**, the LMB was not facing any serious threat. Only some areas of Phongsaly, Luangnamtha, and Vientiane of Lao PDR were having moderate drought during the monitoring week. Other areas were normal or wet.

- The monthly drought forecast shows that in October and November the LMB is likely wet in the north and east while normal in other areas. During December, normal and wet conditions are forecasted for the region with some moderate drought covering Thailand's Chiang Mai, Chiang Rai, Kalasin, and Sakon Nakhon in the north and centre and Cambodia's Otdar Meanchey, Siem Reap and Preah Vihear in the south.

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 **10 to 16 October 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 October 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 October and November 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 09-12 October 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 ITCZ band sifting southward and northeasterly wind from China with active tropical disturbance from western Pacific. Under this weather condition, moderate to heavy rainfall occurred over southern parts of LMB, especially over eastern part of Thailand in LMB, the 3S basin, the whole Cambodia, and central to southern parts of Viet Nam.

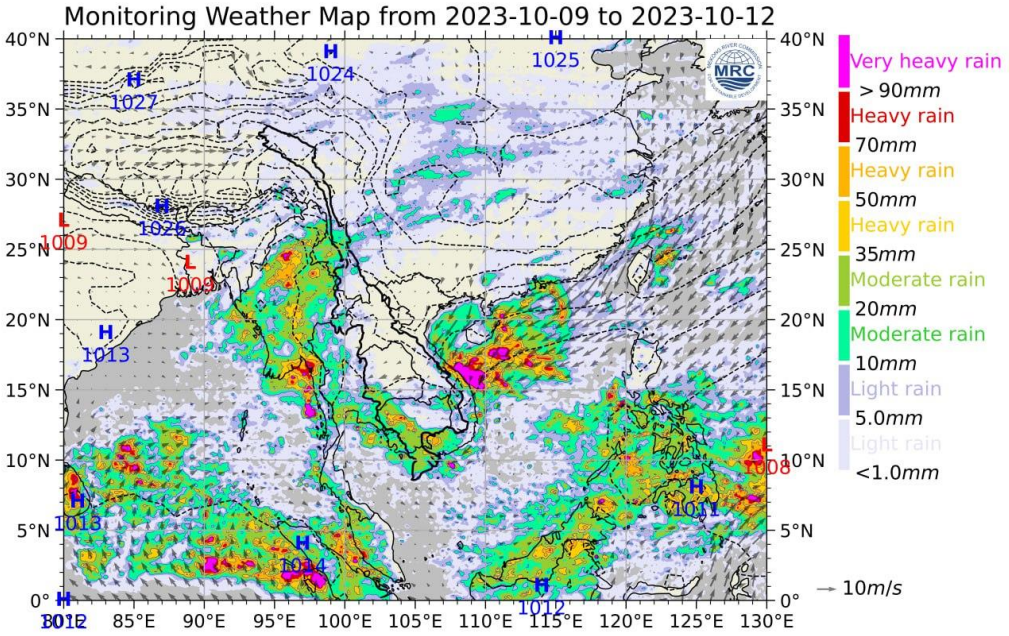


Figure 1. Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), the highest probability of wet condition is predicted over the lower part of the Mekong region from 16 to 29 October 2023. Therefore, the Mekong region is likely dominated by wet condition, which may bring moderate rainfall and warm temperatures in general to the upper and lower parts of the LMB. **Figure 2** shows the outlook of weather condition from 16 to 29 October 2023 in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

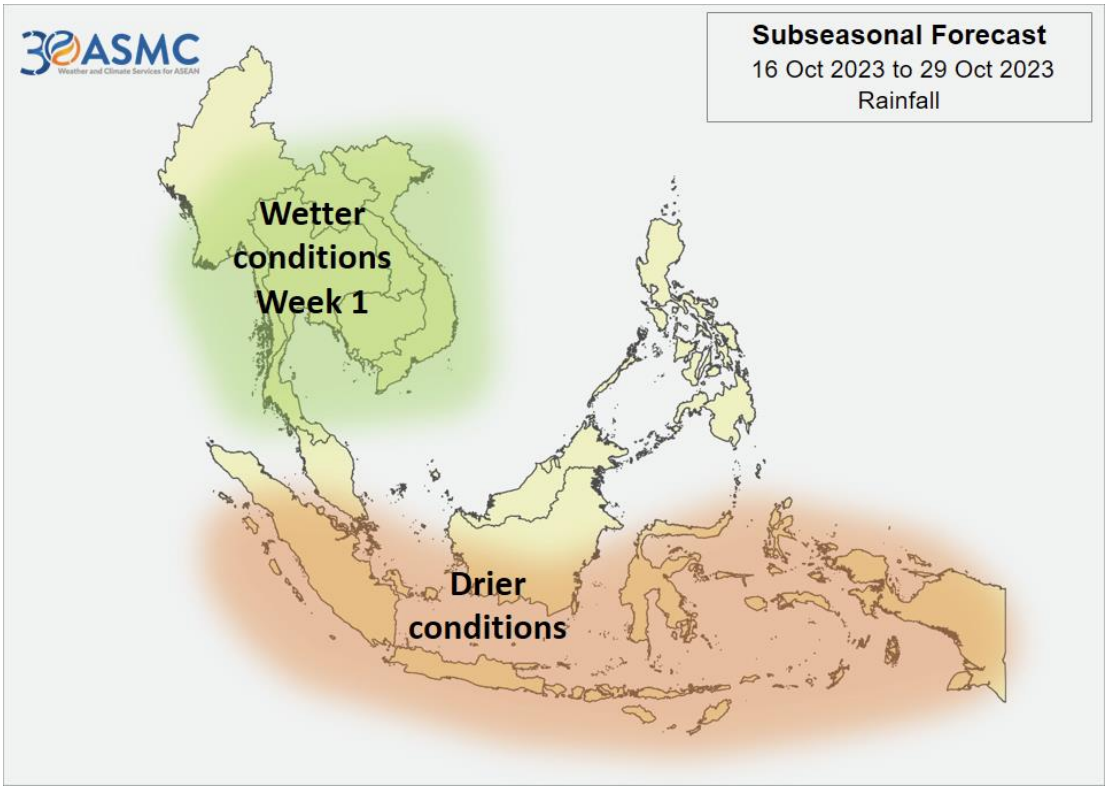


Figure 2. Outlook of wet and dry conditions over the Asian countries by ASMC.

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

There was not any movement of any storm from the sea to the LMB of a tropical storm in the LMB, during 10-16 Oct 2023. However, low-pressure influenced by ITCZ band sifting southward and northeasterly wind from China was observed over the Mekong region, as shown in Figure 1. The active system for the LMB on October 16 is displayed in Figure 3.

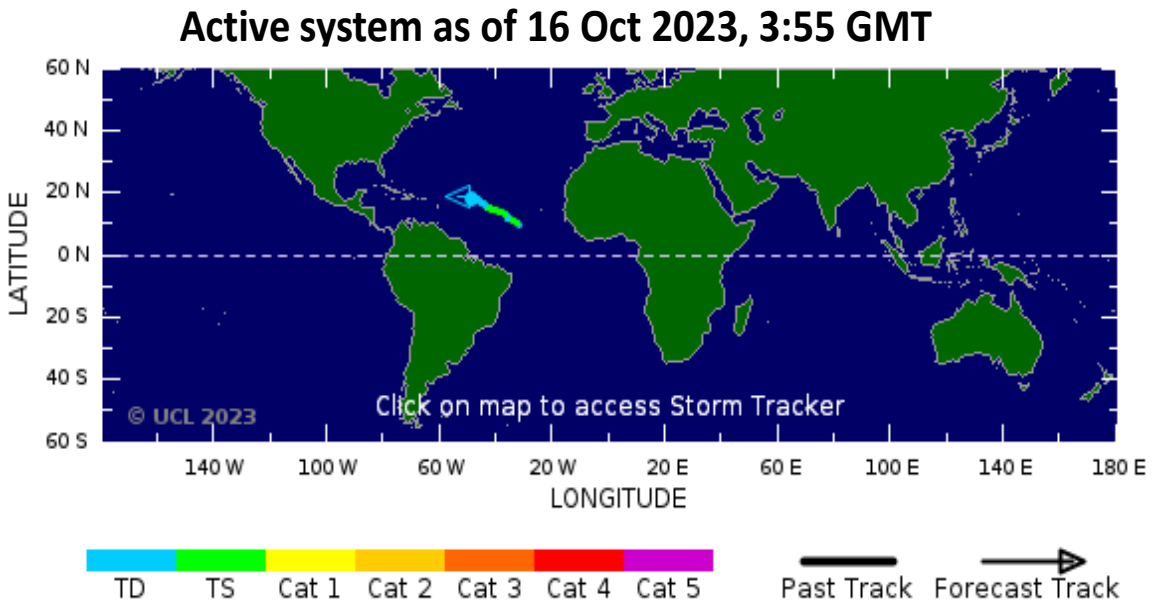


Figure 3. A tropical depression risk observed on 16 October 2023.

2.2 Rainfall patterns over the LMB

This week from 10 to 16 Oct 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 6.50 mm to 190.00 mm. The highest rainfall of this week report was recorded at Chau Doc in Viet Nam reaching 190.00 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 low in the LMB, compared with its last week rainfall in most of the stations.

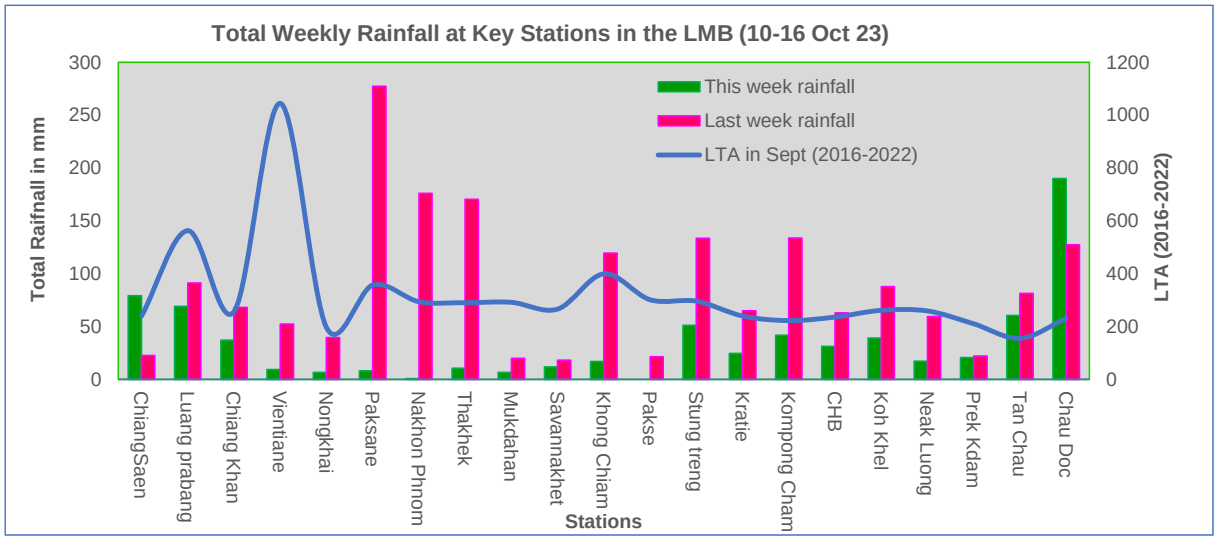


Figure 4. Weekly total rainfall at key stations in the LMB during 10-16 October 2023.

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 10 to 16 Oct 2023.

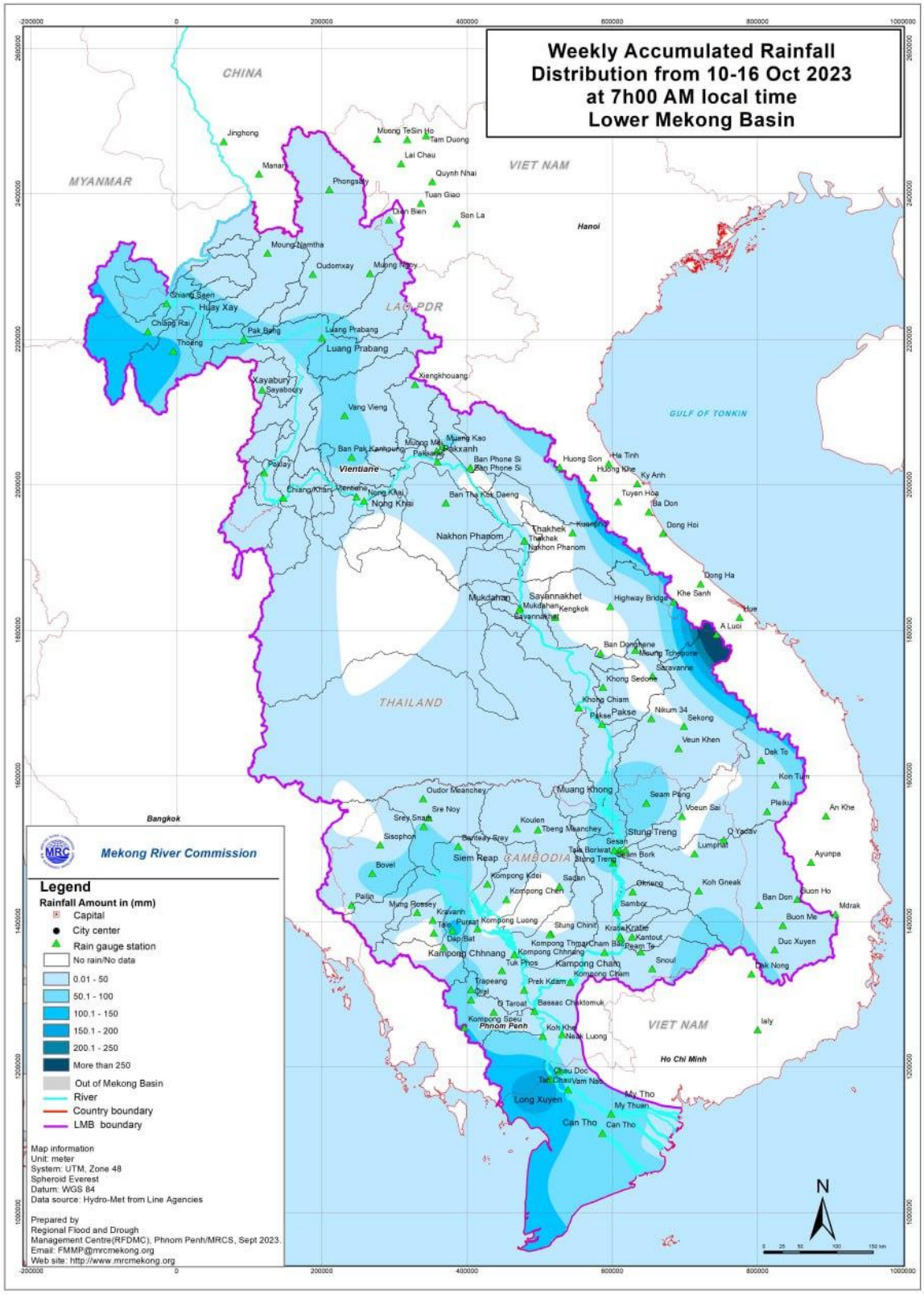


Figure 5. Weekly rainfall distribution over the LMB during 10-16 October 2023.

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.

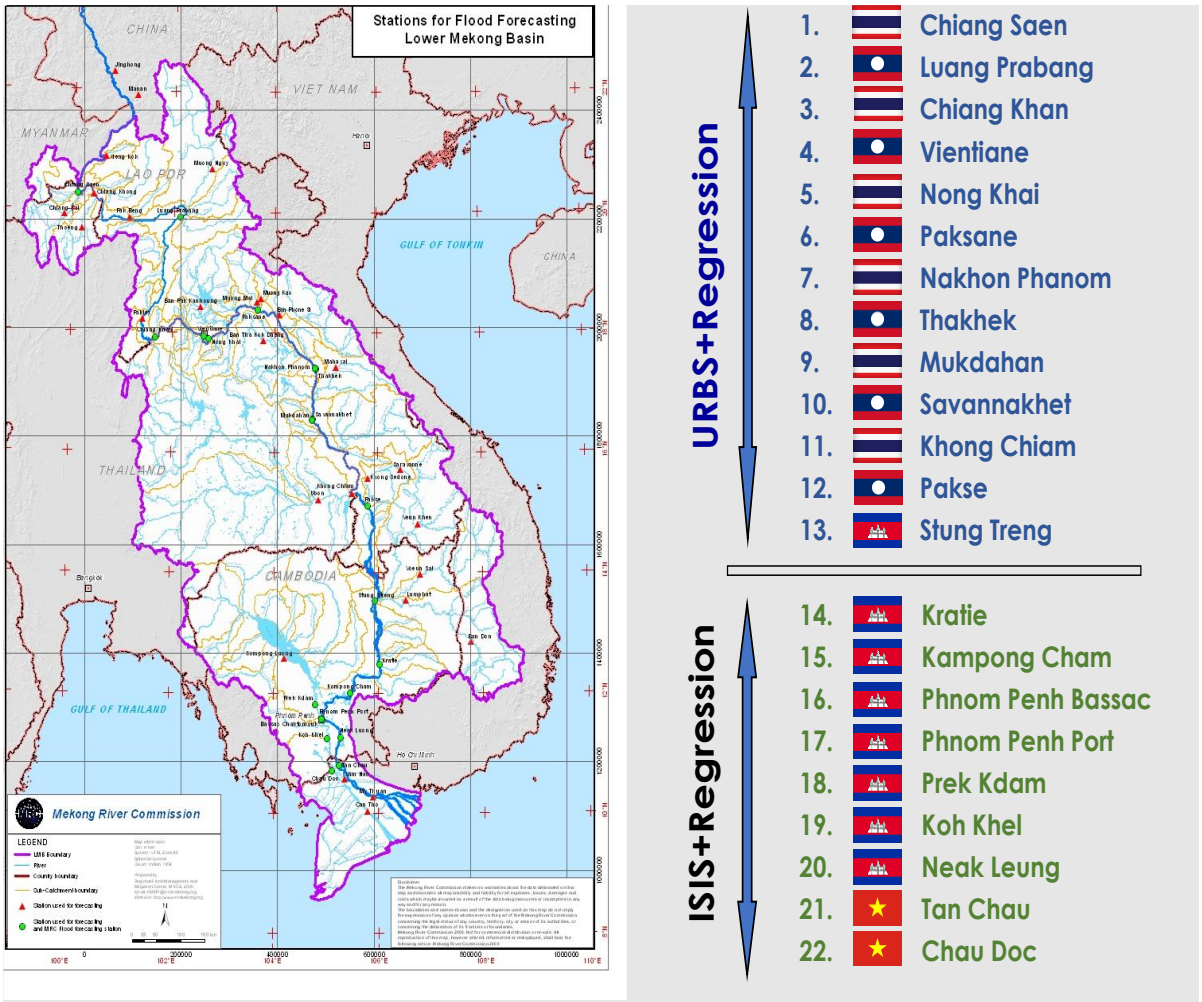


Figure 6. Key stations and model application for River Monitoring and Flood Forecasting.

According to MRC's observed water level at Jinghong, it showed fluctuated levels between **535.79 m** and **536.53 m** during 10-16 October 2023 (recorded on 7:00 am). The current level is staying about 0.14 m higher than its LTA value (max: 2015-2022). The outflow at Jinghong station varied between 1,210.00 m^3/s and 1,770.00 m^3/s from 10-16 October 2023. Figure 7 below presents water level that decreased at the Jinghong hydrological station[1], indicating the trend of fluctuating water level up to 16 October 2023.

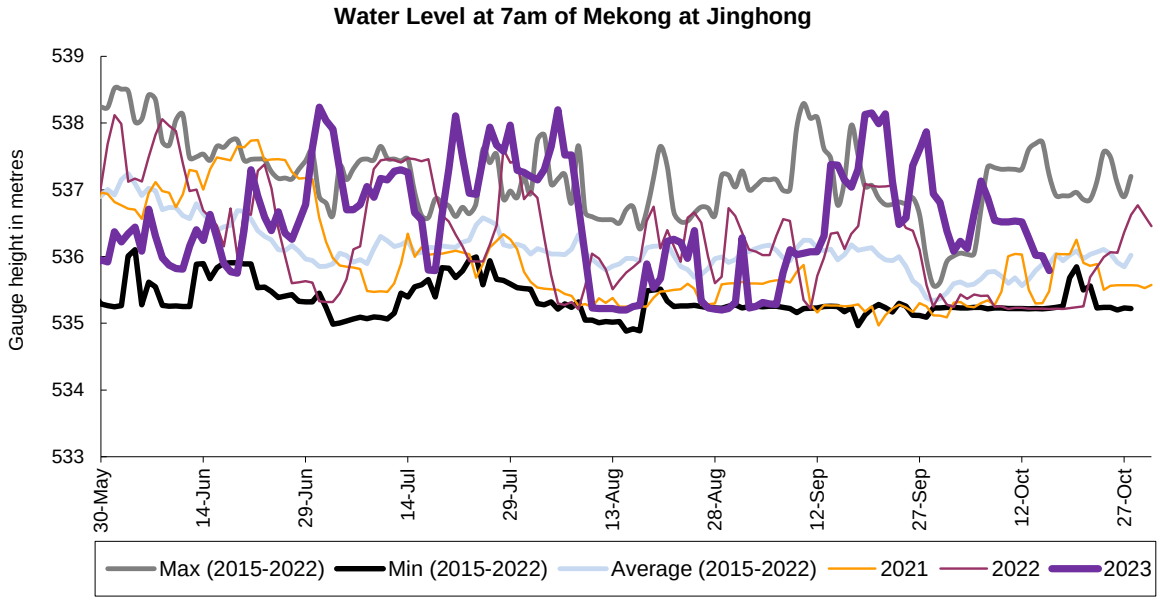


Figure 7. Water level at the Jinghong hydrological station up to 16 October 2023.

With the fluctuated outflow from Jinghong upstream, water levels of monitoring stations at Xieng Kok in Lao PDR, upper of Chiang Saen, showed an decreased water level about 1.67 m; while at Chiang Saen in Thailand it showed a decrease of about 0.42 m from 10 to 16 October 2023, staying about 1.08 m lower than its LTA level and considered low.

Water level at Chiang Khan in Thailand from 10 to 16 Oct 2023, moreover, decreased about 0.58 m and stayed about 0.32 m lower than its LTA value; while water level at Vientiane station decreased about 0.62 m and still stayed about 0.83 higher than its LTA level, which was **considered normal**. Water levels at Nong Khai decreased about 0.43 m, staying 0.02 m lower than its LTA value. For Paksane it decreased about 0.67 m due to impacted rainfall and hydropower operation from upstream, staying about 0.17 m higher than their LTA value, **which was still considered normal**.

Water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR decreased between 1.06 m and 1.68 m, but still wate levels at those stations were stayed higher than their LTA values, **considered normal**. From the stretches of the river at Stung Treng, water level decreased 0.91 m and stayed about 0.55 m higher than its LTA, while at Kratie water level was down about 1.41 m, staying 1.31 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 0.01 m and stayed 0.72 m lower than its LTA value. Water levels at Chaktomuk, Koh Khel, Phnom Penh Port and Prek Kdam in Cambodia up between 0.01 m and 0.10 m. Water levels at these stations were still lower than their LTA level, excepted at Koh Khel the water level is slightly higher than its LTA value **considering normal**.

Water levels at most of the stations along the Mekong River were staying higher than their LTA values, excepted at stations from Chiang Saen, Chiang Khan, Nong Khai and the station at the lower part in Cambodia, during this week report. The tidal stations at Tan Chua and Chau Doc had WLs 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 10 to 16 Oct 2023 at Thailand's Chiang Saen station decreased from 3.97 m to 3.55 m, showing 1.08 m lower than its Long-Term-Average (LTA) value, which considered low. The water level at Luang Prabang station in Lao PDR increased about 0.01 m during the reporting period. This level still shows 0.17 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**.

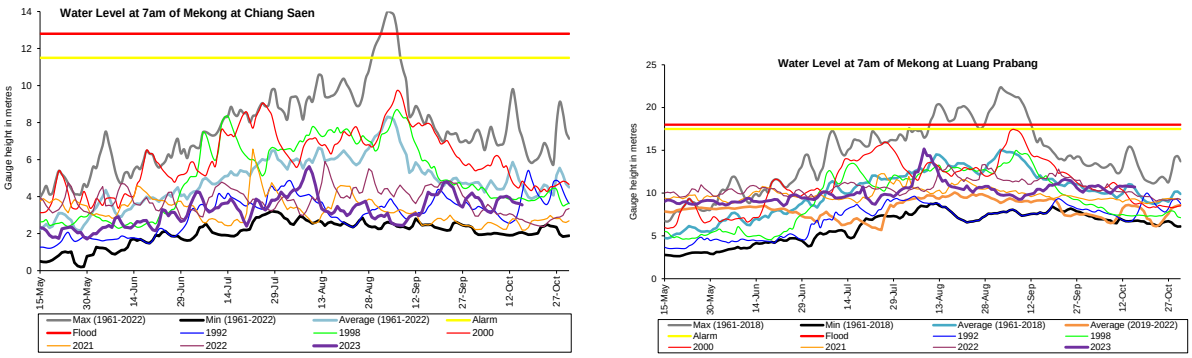


Figure 8. Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) decreased about 0.58 m and still staying about 0.32 m lower than its LTA value. At Vientiane in Lao PDR,

it decreased about 0.62 m and showed 0.83 m higher than its LTA during the reporting week of 10-16 Oct 2023. At Nong Khai station in Thailand, the water level was down about 0.43 m from 6.88 m to 6.45 m, staying about 0.02 m lower than its LTA value, during the reporting period. At Paksane in Lao PDR, water level decreased about 0.67 m on the same period of the report. The water level at this station was about 0.12 m higher than its LTA value. The recently decreased water levels at Paksane were obviously due to low rainfalls contributed from the sub-catchment area along with the inflows and reservoir operation in the upstream part. The water levels at Vientiane and Paksane are shown in Figure 9 below.

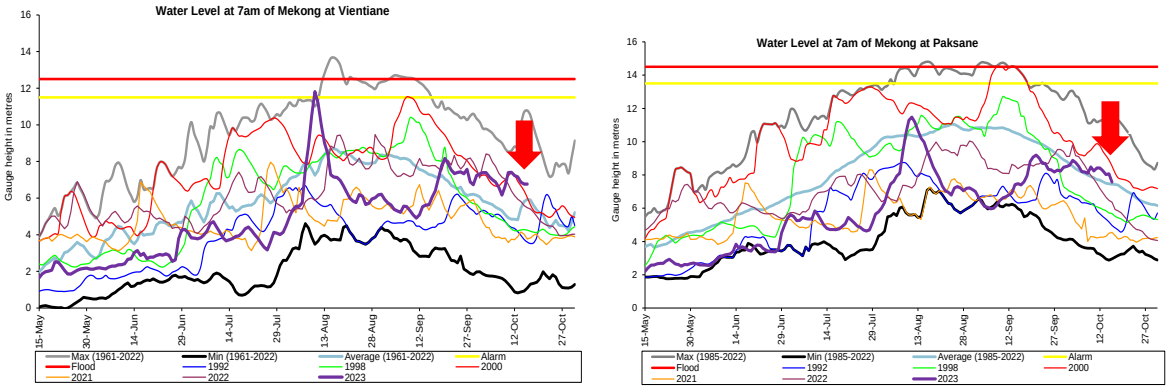


Figure 9. Water levels Veintiane and Paksane in Lao PDR.

Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR decreased between 1.06 m and 1.68 m, still showing water levels at these stations were higher than their LTA values, which considered normal. Figure 10 shows the water levels at Nakhon Phanom and Pakse stations.

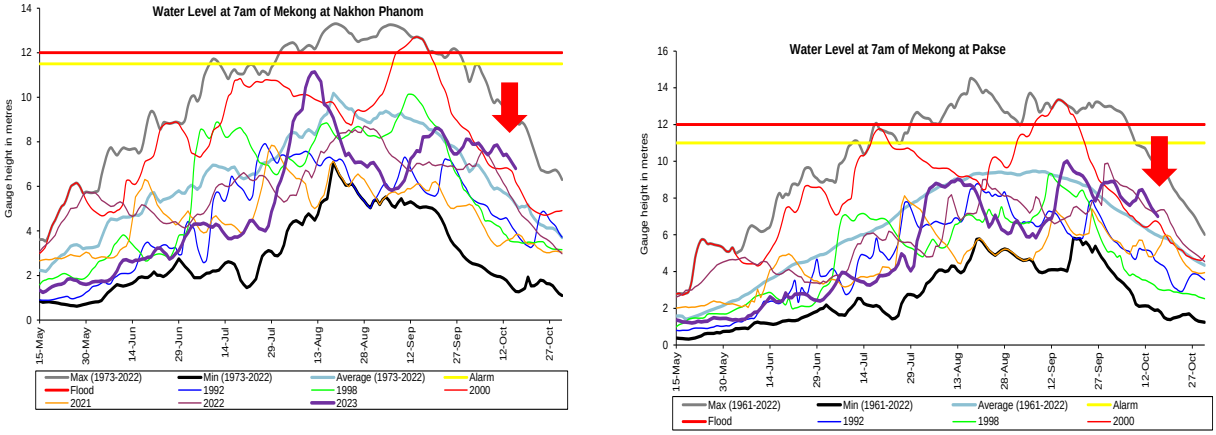


Figure 10. Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR

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

Following the same trend and rainfall 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 decreasing during 10-16 Oct 2023. The water levels at Stung Treng decreased about 0.91 m and still stayed about 0.55 m higher than its LTA, while at Kratie it decreased about 1.41 m, staying about 1.31 m higher than its LTA (as showed in Figure 11). The water level at Kompong Cham station decreased about 0.68 m and was about 0.24 m higher 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.

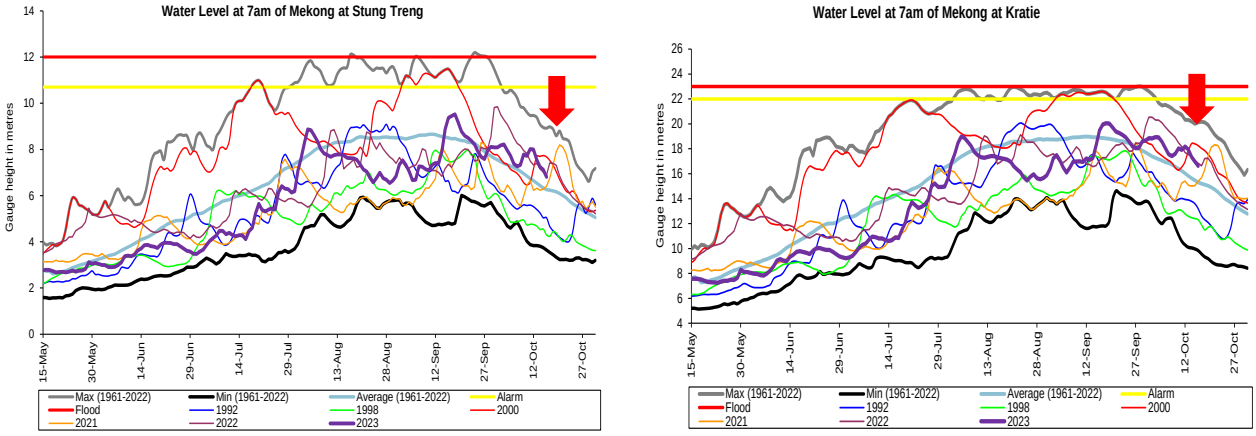


Figure 11. Water levels at Stung Treng and Kratie on the Mekong River.

At Chaktomuk on the Bassac River, due to average rainfall and contributed flows from upstream catchment, the water level increased by about 0.01 m and stayed 0.72 m lower than its LTA value; while at Koh Khel, water level increased about 0.01 m, staying 0.23 m higher than its LTA value. The water level at Prek Kdam on the Tonle Sap Lake increased about 0.10 m and was about 0.70 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 average 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 continue to fall, considered normal**.

Tidal stations at Tan Chau and Chau Doc

Like last week, the water levels from 10 to 16 October 2023 at Viet Nam's Tan Chau and Chau Doc were increased due to daily tidal effects from the sea. The increased levels were between 2.72 m and 3.01 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 October 16 of this reporting period, **it was observed that the main outflow from the Tonle Sap Lake increased due to moderate 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 and 2021 but lower than 2022 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 slightly up from the current level.

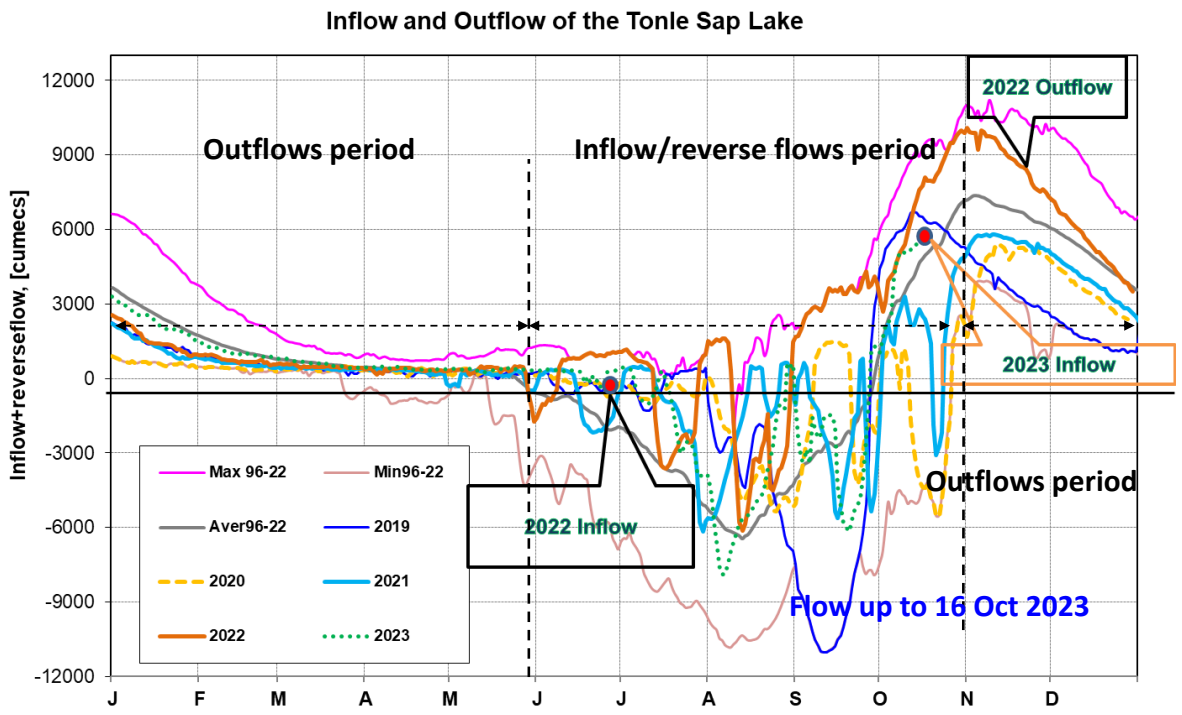


Figure 12. Seasonal change of inflows and outflows of Tonle Sap Lake

Figure 13 shows seasonal changes in monthly flow volumes up to 16 October 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 October 16, **the water volume of the Tonle Sap Lake was higher than 2020, 2021 but lower than 2022 and its LTA (about 76%), 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.

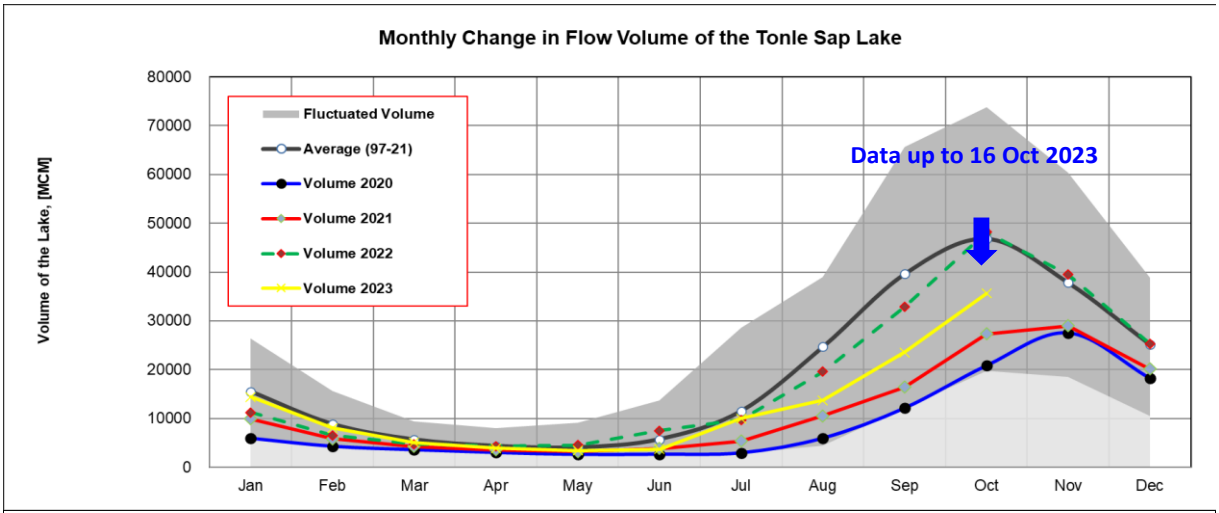


Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.

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	9953.41	86.60
Aug	24666.69	39015.12	4433.46	7622.71	5941.07	10547.80	19554.70	13694.57	55.52
Sep	39634.03	65632.35	12105.31	24194.19	12105.31	16382.34	32860.34	23550.60	59.42
Oct	46873.44	73757.23	19705.50	30358.38	20799.13	27318.21	48199.12	35635.29	76.02
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 10 to 16 October 2023, the LMB received from small to heavy rain and isolated thundershowers in some areas.

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

Table 2. Detected low-risk flash flood in the LMB during 10 to 16 October.

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 13/10/2023 6:00 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
Quang Tri	Gio Linh	Northeast	Low-Risk	Thua Thien Hue	Phong Dien	Northeast	Moderate-Risk	Quang Tri	TX. Dong Ha	Northeast	Low-Risk
Quang Tri	TX. Dong Ha	Northeast	Low-Risk	Thua Thien Hue	A Luoi	Northeast	Moderate-Risk	Quang Tri	Da Krong	Northeast	Low-Risk
Thua Thien Hue	A Luoi	Northeast	Low-Risk	Quang Nam	Hien	Northeast	Low-Risk	Quang Tri	Huong Hoa	Northeast	Low-Risk
Thua Thien Hue	Phong Dien	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Low-Risk	Thua Thien Hue	A Luoi	Northeast	Low-Risk
Thua Thien Hue	Quang Dien	Northeast	Low-Risk	Quang Nam	Hien	Northeast	Moderate-Risk	Thua Thien Hue	Phong Dien	Northeast	Moderate-Risk
Thua Thien Hue	Phong Dien	Northeast	Low-Risk	Thua Thien Hue	Nam Dong	Northeast	Low-Risk	Thua Thien Hue	Quang Dien	Northeast	Low-Risk
Thua Thien Hue	A Luoi	Northeast	High-Risk	Da Nang	Hoa Vang	Northeast	Low-Risk	Thua Thien Hue	Phong Dien	Northeast	Low-Risk
Thua Thien Hue	Nam Dong	Northeast	Low-Risk	Da Nang	Lien Chieu	Northeast	Low-Risk	Thua Thien Hue	A Luoi	Northeast	Moderate-Risk
Thua Thien Hue	A Luoi	Northeast	Low-Risk	Da Nang	Hoa Vang	Northeast	Moderate-Risk	Thua Thien Hue	Nam Dong	Northeast	Low-Risk
Quang Nam	Hien	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk	Thua Thien Hue	A Luoi	Northeast	Low-Risk
Quang Nam	Hien	Northeast	Moderate-Risk	Da Nang	Hoa vang	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk
Quang Nam	Hien	Northeast	Moderate-Risk	Quang Nam	Dai Loc	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk
Thua Thien Hue	Nam Dong	Northeast	Moderate-Risk	Quang Nam	Dai Loc	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk
Da Nang	Hoa Vang	Northeast	Moderate-Risk	Quang Nam	Que Son	Northeast	Low-Risk	Thua Thien Hue	Nam Dong	Northeast	Moderate-Risk
Da Nang	Lien Chieu	Northeast	Low-Risk					Da Nang	Hoa Vang	Northeast	Low-Risk
Da Nang	Hoa Vang	Northeast	High-Risk					Da Nang	Lien Chieu	Northeast	Low-Risk
Quang Nam	Hien	Northeast	High-Risk					Da Nang	Hoa Vang	Northeast	Moderate-Risk
Da Nang	Hoa vang	Northeast	Moderate-Risk					Quang Nam	Hien	Northeast	Moderate-Risk
Quang Nam	Dai Loc	Northeast	Moderate-Risk					Da Nang	Hoa vang	Northeast	Moderate-Risk
Quang Nam	Dai Loc	Northeast	Moderate-Risk					Quang Nam	Dai Loc	Northeast	Moderate-Risk
Quang Nam	Que Son	Northeast	Low-Risk					Quang Nam	Dai Loc	Northeast	Moderate-Risk
Quang Nam	Que Son	Northeast	Low-Risk					Quang Nam	Que Son	Northeast	Low-Risk
								Quang Nam	Que Son	Northeast	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 13/10/2023 6:00 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
Quang Tri	Gio Linh	Northeast	Low-Risk	Thua Thien Hue	Phong Dien	Northeast	Moderate-Risk	Quang Tri	TX. Dong Ha	Northeast	Low-Risk
Quang Tri	TX. Dong Ha	Northeast	Low-Risk	Thua Thien Hue	A Luoi	Northeast	Moderate-Risk	Quang Tri	Da Krong	Northeast	Low-Risk
Thua Thien Hue	A Luoi	Northeast	Low-Risk	Quang Nam	Hien	Northeast	Low-Risk	Quang Tri	Huong Hoa	Northeast	Low-Risk
Thua Thien Hue	Phong Dien	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Low-Risk	Thua Thien Hue	A Luoi	Northeast	Low-Risk
Thua Thien Hue	Quang Dien	Northeast	Low-Risk	Quang Nam	Hien	Northeast	Moderate-Risk	Thua Thien Hue	Phong Dien	Northeast	Moderate-Risk
Thua Thien Hue	Phong Dien	Northeast	Low-Risk	Thua Thien Hue	Nam Dong	Northeast	Low-Risk	Thua Thien Hue	Quang Dien	Northeast	Low-Risk
Thua Thien Hue	A Luoi	Northeast	High-Risk	Da Nang	Hoa Vang	Northeast	Low-Risk	Thua Thien Hue	Phong Dien	Northeast	Low-Risk
Thua Thien Hue	Nam Dong	Northeast	Low-Risk	Da Nang	Lien Chieu	Northeast	Low-Risk	Thua Thien Hue	A Luoi	Northeast	Moderate-Risk
Thua Thien Hue	A Luoi	Northeast	Low-Risk	Da Nang	Hoa Vang	Northeast	Moderate-Risk	Thua Thien Hue	Nam Dong	Northeast	Low-Risk
Quang Nam	Hien	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk	Thua Thien Hue	A Luoi	Northeast	Low-Risk
Quang Nam	Hien	Northeast	Moderate-Risk	Da Nang	Hoa vang	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk
Quang Nam	Hien	Northeast	Moderate-Risk	Quang Nam	Dai Loc	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk
Thua Thien Hue	Nam Dong	Northeast	Moderate-Risk	Quang Nam	Dai Loc	Northeast	Moderate-Risk	Quang Nam	Hien	Northeast	Moderate-Risk
Da Nang	Hoa Vang	Northeast	Moderate-Risk	Quang Nam	Que Son	Northeast	Low-Risk	Thua Thien Hue	Nam Dong	Northeast	Moderate-Risk
Da Nang	Lien Chieu	Northeast	Low-Risk					Da Nang	Hoa Vang	Northeast	Low-Risk
Da Nang	Hoa Vang	Northeast	High-Risk					Da Nang	Lien Chieu	Northeast	Low-Risk
Quang Nam	Hien	Northeast	High-Risk					Da Nang	Hoa Vang	Northeast	Moderate-Risk
Da Nang	Hoa vang	Northeast	Moderate-Risk					Quang Nam	Hien	Northeast	Moderate-Risk
Quang Nam	Dai Loc	Northeast	Moderate-Risk					Da Nang	Hoa vang	Northeast	Moderate-Risk
Quang Nam	Dai Loc	Northeast	Moderate-Risk					Quang Nam	Dai Loc	Northeast	Moderate-Risk
Quang Nam	Que Son	Northeast	Low-Risk					Quang Nam	Dai Loc	Northeast	Moderate-Risk
Quang Nam	Que Son	Northeast	Low-Risk					Quang Nam	Que Son	Northeast	Low-Risk
								Quang Nam	Que Son	Northeast	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 products 16/10/2023 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
Sekong	Kaleum		Northwest	Low-Risk	Sekong	Kaleum		Northwest	Low-Risk	Sekong	Kaleum		Northwest	Low-Risk
Sekong	Kaleum		Northwest	Moderate-Risk	Sekong	Kaleum		Northwest	Low-Risk	Sekong	Kaleum		Northwest	Moderate-Risk
Sekong	Kaleum	TAHIT	Northwest	Low-Risk	Sekong	Kaleum	TAHIT	Northwest	Low-Risk	Sekong	Kaleum	AR-LANG	Northwest	Low-Risk
Attapeu	Sanxay		Northwest	Low-Risk	Attapeu	Sanxay		Northwest	Low-Risk	Sekong	Kaleum	TAHIT	Northwest	Low-Risk
Sekong	Dakcheung		Northwest	Low-Risk	Sekong	Dakcheung		Northwest	Low-Risk	Sekong	Dakcheung		Northwest	Low-Risk
Sekong	Kaleum		Northwest	Low-Risk	Sekong	Kaleum		Northwest	Low-Risk	Attapeu	Sanxay		Northwest	Low-Risk
Attapeu	Sanxay		Northwest	Moderate-Risk	Attapeu	Sanxay		Northwest	Moderate-Risk	Sekong	Dakcheung		Northwest	Low-Risk
Attapeu	Sanxay		Northwest	Low-Risk	Attapeu	Sanxay		Northwest	Low-Risk	Sekong	Kaleum		Northwest	Low-Risk
										Sekong	Dakcheung		Northwest	Low-Risk
										Attapeu	Sanxay		Northwest	Moderate-Risk
										Attapeu	Sanxay		Northwest	Low-Risk
										Attapeu	Sanxay		Northwest	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 products 15/10/2023 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	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk
Sekong	Kaleum		Northwest	Low-Risk	Sekong	Kaleum		Northwest	Moderate-Risk	Sekong	Kaleum		Northwest	Low-Risk
Sekong	Kaleum		Northwest	High-Risk	Sekong	Kaleum		Northwest	Moderate-Risk	Sekong	Kaleum		Northwest	Low-Risk
Sekong	Kaleum		Northwest	Low-Risk	Sekong	Kaleum	AR-LANG	Northwest	Low-Risk	Saravane	Ta oi		Northwest	Low-Risk
Sekong	Kaleum		Northwest	Moderate-Risk	Sekong	Kaleum	TAHIT	Northwest	Low-Risk	Sekong	Kaleum		Northwest	Moderate-Risk
Sekong	Kaleum	AR-LANG	Northwest	Low-Risk	Sekong	Dakcheung		Northwest	Low-Risk	Sekong	Kaleum		Northwest	Low-Risk
Sekong	Kaleum	TAHIT	Northwest	Low-Risk	Sekong	Kaleum		Northwest	Moderate-Risk	Sekong	Kaleum		Northwest	Moderate-Risk
Sekong	Dakcheung		Northwest	Low-Risk	Sekong	Dakcheung		Northwest	Low-Risk	Sekong	Kaleum	AR-LANG	Northwest	Low-Risk
Sekong	Kaleum		Northwest	High-Risk	Attapeu	Sanxay		Northwest	Moderate-Risk	Sekong	Kaleum	TAHIT	Northwest	Low-Risk
Sekong	Dakcheung		Northwest	Low-Risk						Sekong	Dakcheung		Northwest	Low-Risk
Attapeu	Sanxay		Northwest	Low-Risk						Sekong	Dakcheung		Northwest	Low-Risk
Attapeu	Sanxay		Northwest	High-Risk						Sekong	Kaleum		Northwest	Moderate-Risk

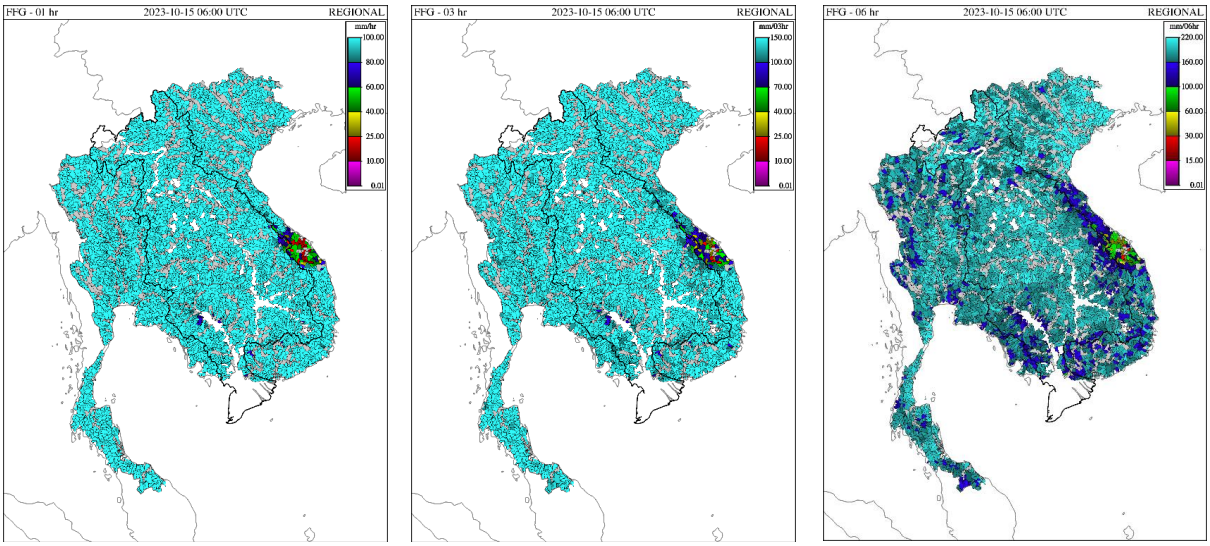


Figure 14. Flash Flood Guidance for the next 1-hr, 3-hr and 6-hr on October 15

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from 9 to 15 October 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 Oct 9 to 15, as displayed in Figure 15, shows that the LMB was mostly normal. There were only some moderate with severe droughts in the southern part of the region. The conditions were similar to the previous week. The impacted areas are listed in the table below.

Number	Country	Province	Mderate	Severe	Extreme
1	Cambodia	Kampong Chhnang	x	x	
2	Cambodia	Kampong Speu	x	x	
3	Cambodia	Kandal	x	x	
4	Cambodia	Kampong Cham	x	x	
17	Laos	Phongsaly	x	x	
22	Laos	Luangnamtha	x		
		Moderate		Extreme	
		Severe		No drought	

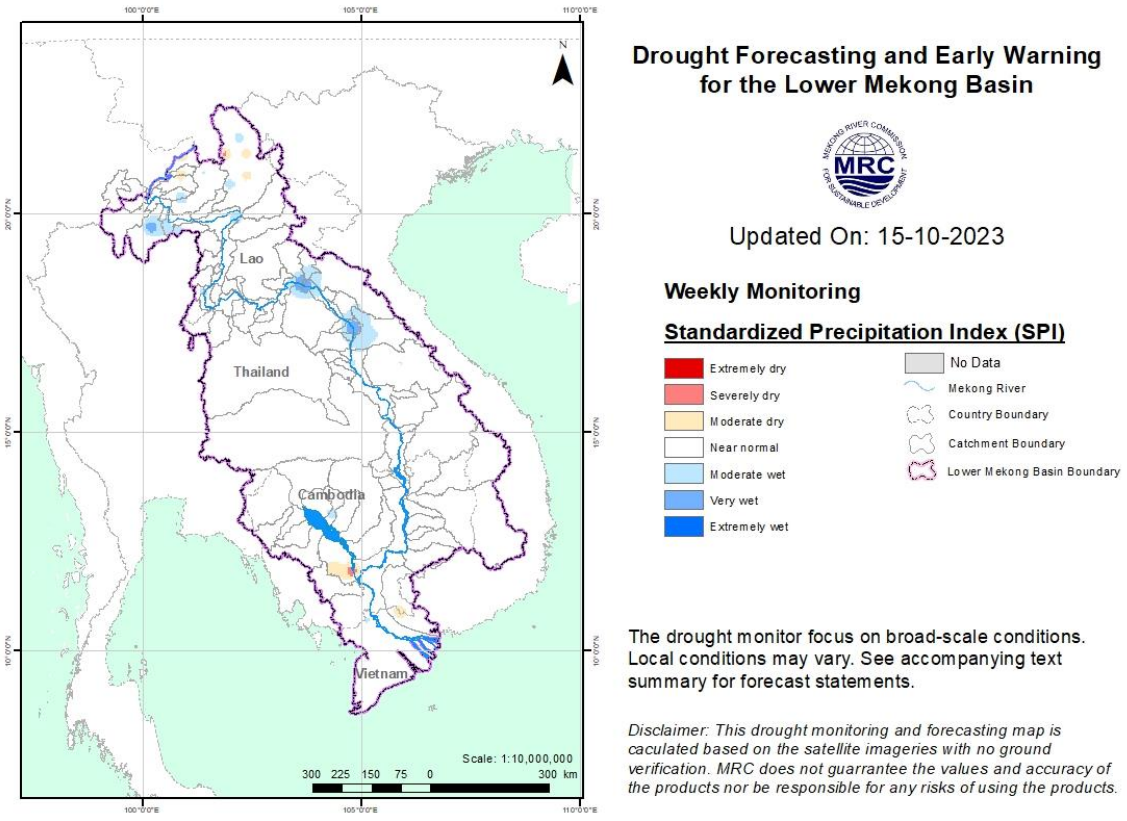


Figure 15. Weekly standardized precipitation index from 9 to 15 Oct 2023.

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

The agricultural indicator through ISWF, **Figure 16**, indicates that the LMB was facing some severe drought in the north during the monitoring week from Oct 9 to 15.

Number	Country	Province	Mderate	Severe	Extreme
1	Cambodia	Otdar Meanchey	x		
2	Cambodia	Siem Reap	x		
3	Cambodia	Preah Vihear	x		
4	Cambodia	Kratie	x		
5	Cambodia	Stung Treng	x		
6	Cambodia	Kampong Cham	x		
7	Cambodia	Kampong Thom	x		
8	Cambodia	Pursat	x		
9	Laos	Phongsaly	x	x	
10	Laos	Luang Prabang	x	x	
11	Laos	Xiengkhuang	x	x	
12	Laos	Xaysomboun	x	x	
13	Laos	Vientiane	x	x	
14	Laos	Xayaburi	x		
15	Laos	Oudomxay	x		
16	Laos	Champasack	x	x	
17	Laos	Attapeu	x		
18	Laos	Khammuane	x	x	
19	Laos	Savannakhet	x		
20	Thailand	Udonthani	x		
21	Thailand	Sakon Nakhon	x		
22	Thailand	Nakhon Phanom	x		
23	Thailand	Nong Khai	x		
24	Thailand	Si Saket	x	x	
25	Thailand	Ubon Ratchathani	x		
26	Viet Nam	Dak Lak	x		
		Moderate		Extreme	
		Severe		No drought	

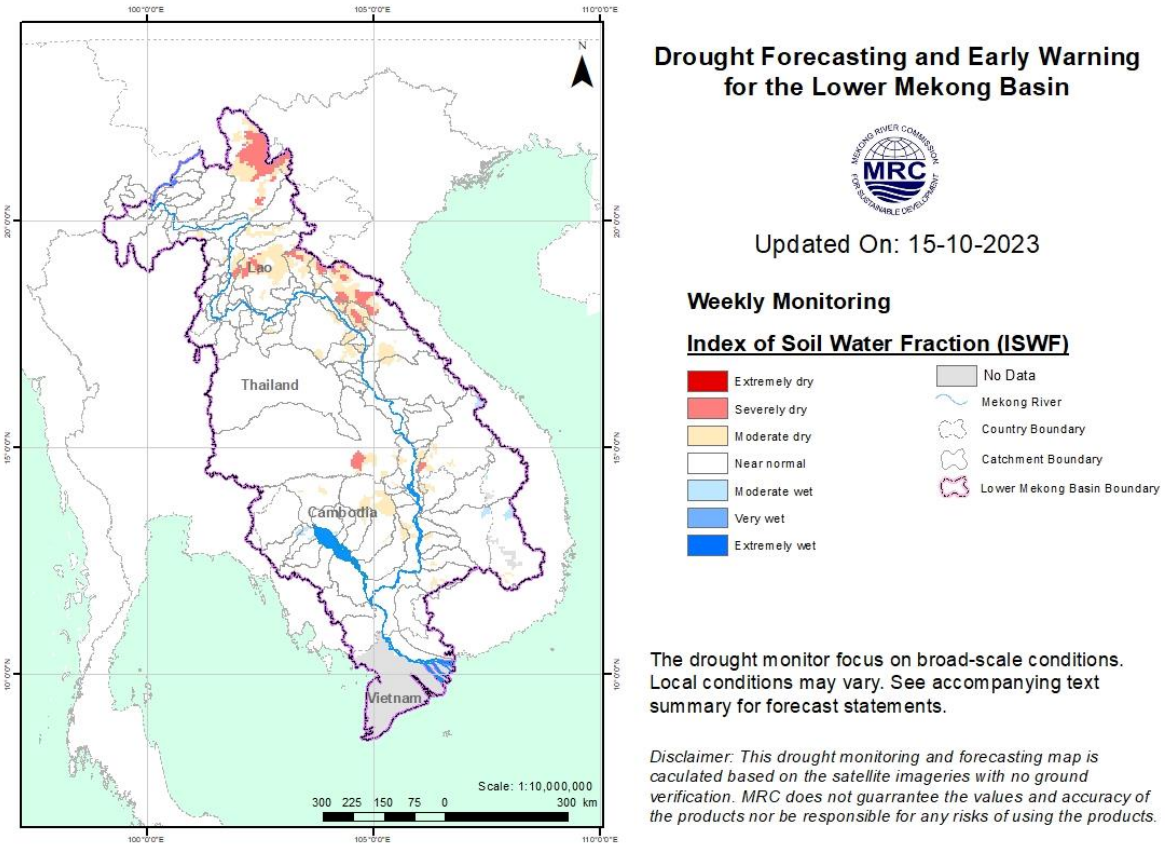


Figure 16. Weekly Index of Soil Water Fraction (ISWF) from Oct 9 to 15

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

The overall drought indicator of CDI as displayed in **Figure 17** shows that the LMB was not facing any serious threat. Only some area of Phongsaly, Luangnamtha, and Vientiane of Lao PDR was having moderate drought during the monitoring week from Oct 9 to 15.

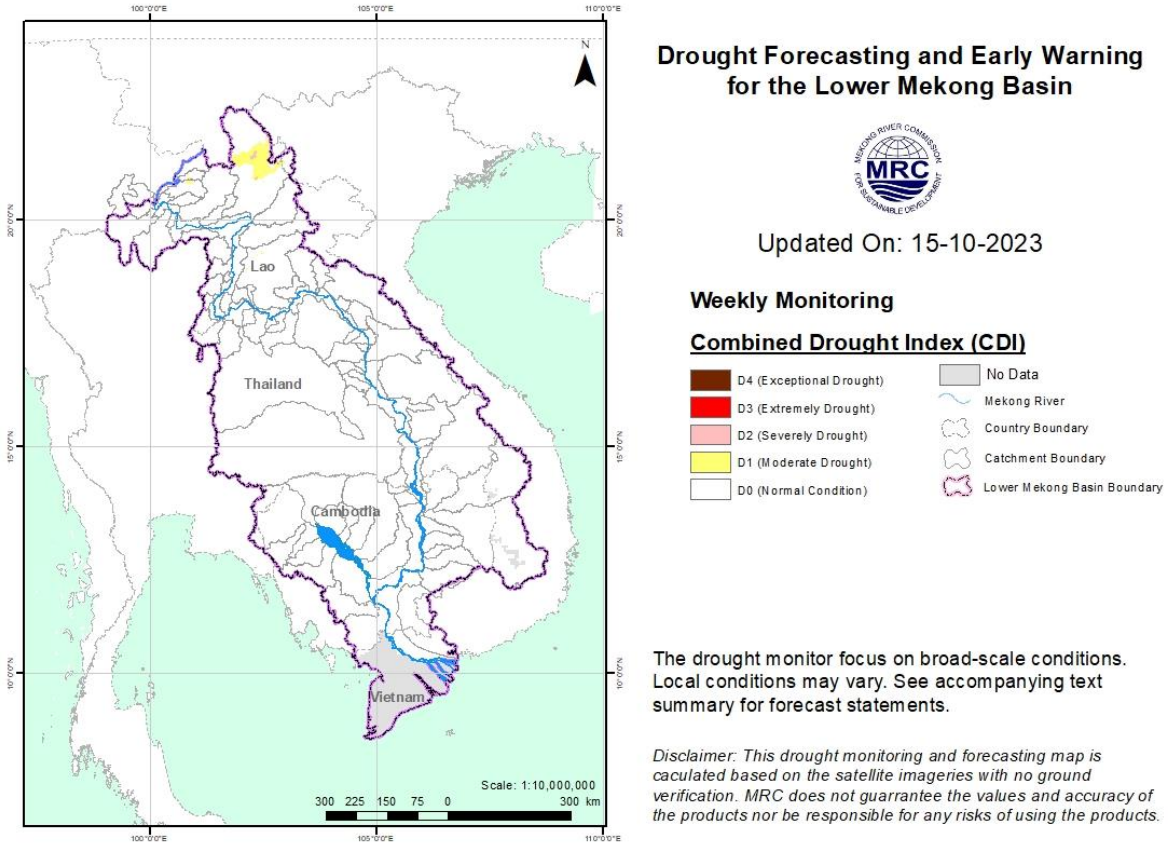


Figure 17. Weekly Combined Drought Index (CDI) from Oct 9 to 15

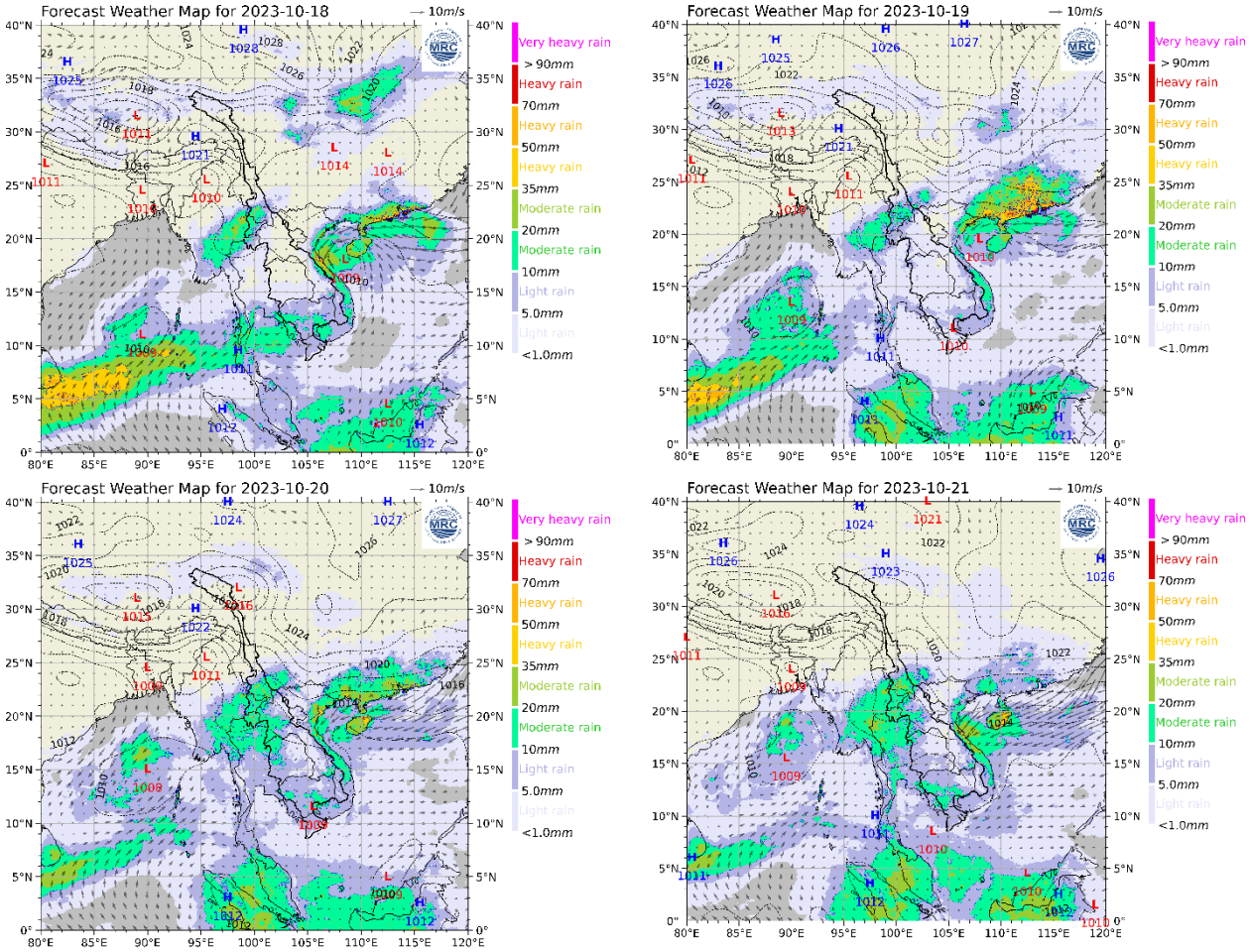
More information on Drought Forecasting and Early Warning (DFEW) as well as the explanation is available here: http://droughtforecast.mrcmekong.org/templates/view/our-product. DFEW provides not only weekly monitoring and forecasting information but also a three-month forecast of drought indicators with 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 October 18-24, 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 moderate rain (5-40 mm/24h) is forecasted for the LMB area.

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



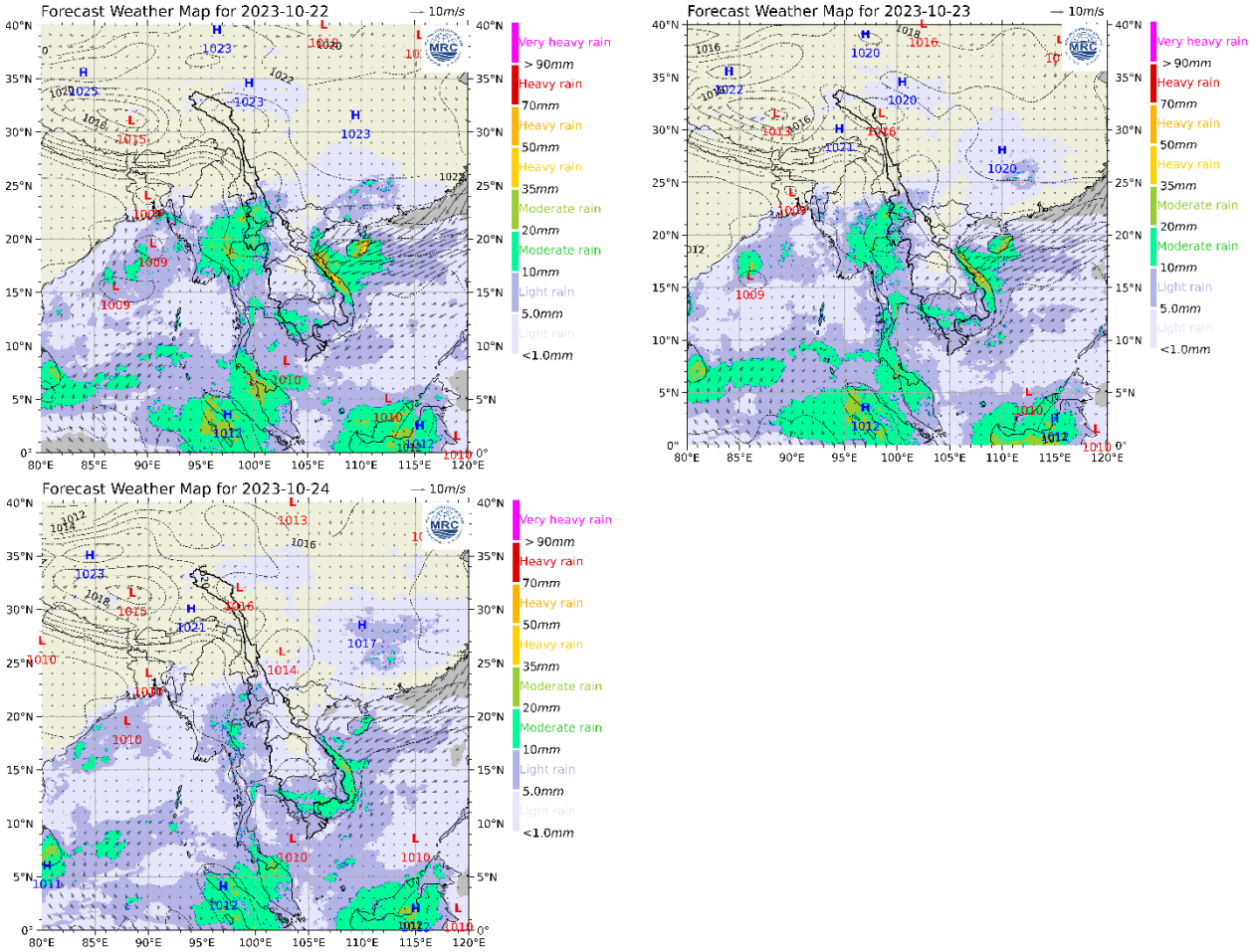


Figure 16. Accumulated rainfall forecast (24 h) based on the forecasting model using CHIRPS-GEFS.

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on October 16's daily flood forecasting bulletin, the daily forecasted water level at Chiang Saen in Thailand shows increase of water level from 3.55 m to 3.84 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 1.08 m during the next five days. The current water level is about 0.17 m higher than its LTA. Low 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 about 0.05 m, while water level at Vientiane in Lao PDR will increase about 0.17 m. Furthermore, in Nong Khai of Thailand the water level will increase about 0.23 m over the next five days; at Paksane in Lao PDR water level will decrease about 0.09 m due to low rainfalls and dam operation in the upper catchments. Rainfall is forecasted for the area of Paksane next week. Consequently, the water levels at these stations will stay lower than their LTA values.

Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR are forecasted to go down between 0.52 m and 0.99 m, due to low rainfall predicted and inflows from upstream into these areas. Water levels at these stations will stay close to their LTA values. Lower to average rainfall is forecasted for the area next week.

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

Water levels at Stung Treng and Kratie in Cambodia will go down between 0.84 m and 1.24 m respectively, while at Kompong Cham along the Mekong River the water level will go down about 0.87 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 0.21 m and 0.43 m over the next five days.

Water levels at most of the stations will go down during next week. Water levels at some stations will be still staying higher than their LTA value. From Chaing Saen to Vientiane/ Nong Khai will be up, but from Paksane to Stung Treng to Kompong Cham and downstream at Phnom Penh the water level will be down. 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 26 September to 16 October 2023, is presented in **Annex 1**.

Table 2 shows the daily flood forecasting Bulletin issued on 16 October 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 moderate rainfall and isolated thunderstorms 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 November 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 monthly forecasts of CDI for October, November, and December 2023.

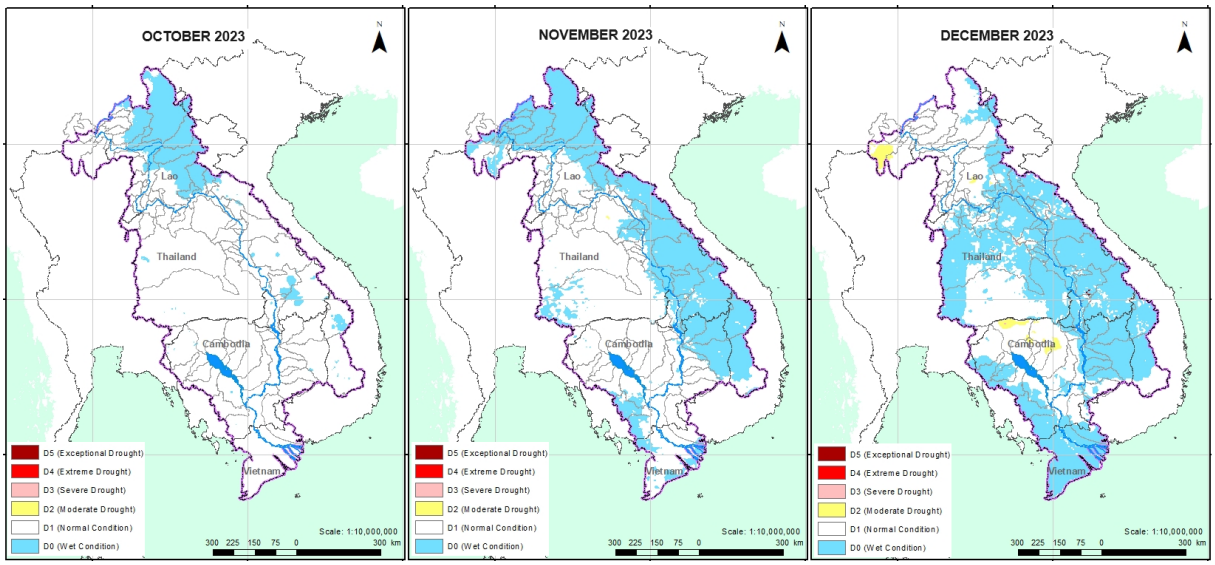


Figure 17. Monthly forecasts of the combined drought index (CDI) for October and November 2023.

Figure 19 above shows that October and November the LMB is likely wet in the north and east while normal in other areas. During December, normal and wet conditions are forecasted for the region with some moderate drought covering Thailand's Chiang Mai, Chiang Rai, Kalasin, and Sakon Nakhon in the north and centre and Cambodia's Otdar Meanchey, Siem Reap and Preah Vihear in the south.

Table 2. Daily 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: 17 October - 21 October 2023

Date: 16 October 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					
		15-Oct				15-Oct	16-Oct	17-Oct	18-Oct	19-Oct	20-Oct	21-Oct	16	17	18	19	20	21
Jinghong		0.5				536.01	535.79						↓	×	×	×	×	×
Chiang Saen		30.0	357.110	12.80	11.50	3.62	3.55	3.65	3.60	3.67	3.75	3.84						
Luang Prabang		0.0	267.195	18.00	17.50	10.76	10.71	10.67	10.61	10.71	10.70	10.76				↑		
Chiang Khan		12.4	194.118	16.00	14.50	8.79	8.76	8.75	8.72	8.68	8.76	8.80						
Vientiane		0.0	158.040	12.50	11.50	6.77	6.77	6.78	6.81	6.83	6.84	6.94						↑
Nongkhai		4.1	153.648	12.20	11.40	6.40	6.45	6.50	6.55	6.58	6.59	6.68						
Paksane		0.0	142.125	14.50	13.50	8.07	7.57	7.50	7.47	7.44	7.46	7.48	↓					
Nakhon Phanom		0.0	130.961	12.00	11.50	7.02	6.80	6.31	6.25	6.22	6.20	6.24	↓	↓				
Thakhek		0.0	129.629	14.00	13.00	8.03	7.80	7.31	7.25	7.21	7.22	7.26	↓	↓				
Mukdahan		0.0	124.219	12.50	12.00	6.75	6.56	6.35	6.00	5.97	5.94	5.92	↓	↓	↓			
Savannakhet		0.0	125.410	13.00	12.00	5.13	4.98	4.81	4.51	4.50	4.48	4.46	↓	↓	↓			
Khong Chiam		0.0	89.030	14.50	13.50	9.00	8.74	8.49	8.24	7.85	7.80	7.75	↓	↓	↓	↓		
Pakse		0.0	86.490	12.00	11.00	7.22	7.00	6.80	6.59	6.27	6.25	6.23	↓	↓	↓	↓		
Stung Treng		nr	36.790	12.00	10.70	7.12	6.81	6.56	6.36	6.20	6.00	5.97	↓	↓	↓	↓	↓	
Kratie		24.5	-0.101	23.00	22.00	16.98	16.62	16.33	16.05	15.81	15.62	15.38	↓	↓	↓	↓	↓	↓
Kompong Cham		2.5	-0.930	16.20	15.20	11.54	11.32	11.10	10.90	10.72	10.56	10.45	↓	↓	↓	↓	↓	↓
Phnom Penh (Bassac)		8.5	-1.020	12.00	10.50	8.20	8.15	8.06	7.98	7.91	7.85	7.81	↓	↓	↓	↓	↓	↓
Phnom Penh Port		-	0.070	11.00	9.50	6.67	6.62	6.53	6.45	6.40	6.35	6.32	↓	↓	↓	↓	↓	↓
Koh Khel (Bassac)		7.0	-1.000	8.40	7.90	7.09	7.06	7.00	6.94	6.89	6.83	6.82	↓	↓	↓	↓	↓	
Neak Luong		7.5	-0.330	8.00	7.50	5.94	5.92	5.80	5.72	5.62	5.55	5.49		↓	↓	↓	↓	↓
Prek Kdam		nr	0.080	10.00	9.50	7.38	7.35	7.29	7.24	7.20	7.17	7.14	↓	↓	↓	↓	↓	↓
Tan Chau		29.5	0.000	4.50	3.50	2.97	2.97	2.95	2.93	2.91	2.89	2.87						
Chau Doc		117.0	0.000	4.00	3.00	2.77	2.75	2.72	2.70	2.68	2.67	2.66		↓				

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 October 10-16, including the lower part in Lao PDR and Cambodia, varying from 6.50 mm to 190.00 mm due to the low pressure covered the low-lying area 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 20.00 mm to 70.00 mm for the next seven days. The forecasting model using CHIRPS-GEFS data, moreover, shows low rainfall (>100 mm) is likely to take place in the Mekong region from 17 to 21 October 2023.

7.2 Water level and its forecast

According to MRC's observed water level at Jinghong, it showed fluctuated water levels from 535.79 m to 536.53 m during 10-16 October 2023**.** The current level is staying about 0.86 m higher than its LTA value. The outflow at Jinghong station varied between 1,210.00 m^3/s and 1,770.00 m^3/s between 10 and 16 October 2023.

With the fluctuated outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen decreased about 0.42 m from 10 to 16 Oct 2023. Moreover, at Chiang Khan the water level decreased about 0.58 m, while at Valentine and Nong Khai they decreased between 0.43 m and 0.62 m due to the influence of dam operation upstream and low rainfall. Water levels from Nakhon Phanom to Pakse decreasing between 1.06 m and 1.68 m. The current WLs at Luang Prabang, Vientiane, Paksane, Nakhon Phanom, Thakhek, Mukdahan, Savannakhet, Khong Chiam, Pakse, Stung Treng, Kratie, Kompong Cham and Koh Khel stations are higher than their LTA levels, **considered normal**. From the stretches of the river at Stung Treng, water levels will decrease 0.84 m and at Kratie water level will down about 1.24 m, and stay higher than its LTA level, due to the contributed rainfall from upstream part including Pakse and reservoir operation of the 3S area in Viet Nam.

The flow volume of the Tonle Sap Lake is lower than its LTA (about 72%) up to October 16. From next week, the flow is expected to slightly increase due to average rainfall forecasted in the inflow catchments of the Tonle Sap Lake.

Most of the station along the Mekong River, the water levels are expected to decrease between 0.50 m and 1.50 m and will remain some higher than their LTA values 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 decrease and stay lower than their LTA values.

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 **Oct 9-15**, the LMB was not facing any serious threat. Only some area of Phongsaly, Luangnamtha, and Vientiane of Lao PDR was having moderate drought during the monitoring week from Oct 9 to 15.

The monthly drought forecast shows that in October and November the LMB is likely wet in the north and east while normal in other areas. During December, normal and wet conditions are forecasted for the region with some moderate drought covering Thailand's Chiang Mai, Chiang Rai, Kalasin, and Sakon Nakhon in the north and centre and Cambodia's Otdar Meanchey, Siem Reap and Preah Vihear in the south.

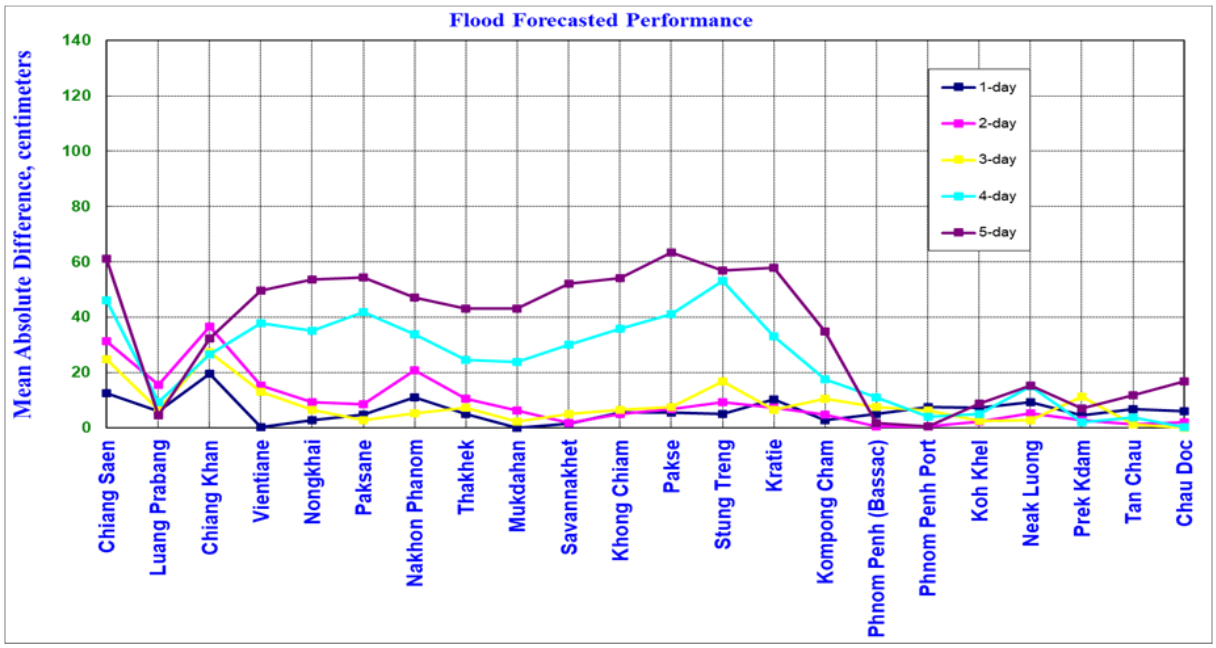
Annex 1: Performance of the weekly flood forecasting

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 10 to 16 October 2023.

The forecasting values from 10 to 16 October 2023 show that the overall accuracy is fair for a four-day to five-day forecast in lead time (less than 60 cm) for most of the stations from the upper to the middle 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 10 to 16 October 2023.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 10 to 16 October 2023 in cm

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
1-day	13	6	20	0	3	5	11	5	0	2	6	6	5	10	3	5	8	7	9	5	7	6
2-day	31	16	37	15	9	9	21	11	6	2	5	7	9	7	5	0	1	2	5	3	1	2
3-day	25	7	27	13	7	3	5	7	2	5	7	8	17	7	11	8	6	3	3	11	1	0
4-day	46	9	27	38	35	42	34	25	24	30	36	41	53	33	18	11	4	5	15	2	4	0
5-day	61	5	32	50	54	54	47	43	43	52	54	63	57	58	35	2	1	9	15	7	12	17

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 10 to 16 October 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	71.4	28.6	71.4	0.0	14.3	28.6	42.9	28.6	14.3	0.0	57.1	57.1	28.6	71.4	28.6	85.7	57.1	100.0	71.4	71.4	100.0	100.0	***51.3***
2-day	83.3	50.0	66.7	33.3	0.0	33.3	33.3	50.0	0.0	16.7	33.3	16.7	33.3	16.7	33.3	0.0	0.0	33.3	33.3	33.3	50.0	33.3	***31.1***
3-day	40.0	20.0	60.0	20.0	20.0	0.0	0.0	40.0	0.0	40.0	0.0	20.0	20.0	0.0	40.0	40.0	60.0	40.0	0.0	100.0	20.0	20.0	***27.3***
4-day	75.0	0.0	25.0	25.0	25.0	0.0	25.0	50.0	25.0	25.0	0.0	25.0	25.0	25.0	25.0	25.0	0.0	50.0	50.0	0.0	50.0	0.0	***25.0***
5-day	33.3	0.0	33.3	33.3	33.3	0.0	33.3	33.3	0.0	0.0	33.3	0.0	33.3	0.0	0.0	0.0	0.0	66.7	33.3	66.7	66.7	66.7	***25.8***

Table B3: Overview of performance indicators for the past 7 days from 10 to 16 October 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	*10:24*	*#DIV/0!*	-	-	*08:15*	*07:10*	*07:08*	*#DIV/0!*	*08:45*	*08:37*	*07:05*	*08:14*	*0*	*0*	*238*	*0*	*0*	*0*	*0*	*0*
month	*10:40*	*#DIV/0!*	-	-	*08:15*	*07:10*	*07:26*	*09:58*	*08:43*	*08:31*	*07:12*	*08:13*	*0*	*0*	*238*	*36*	*34*	*0*	*0*	*61*

Fig. B4: Data delivery times for the past 7 days from 10 to 16 October 2023

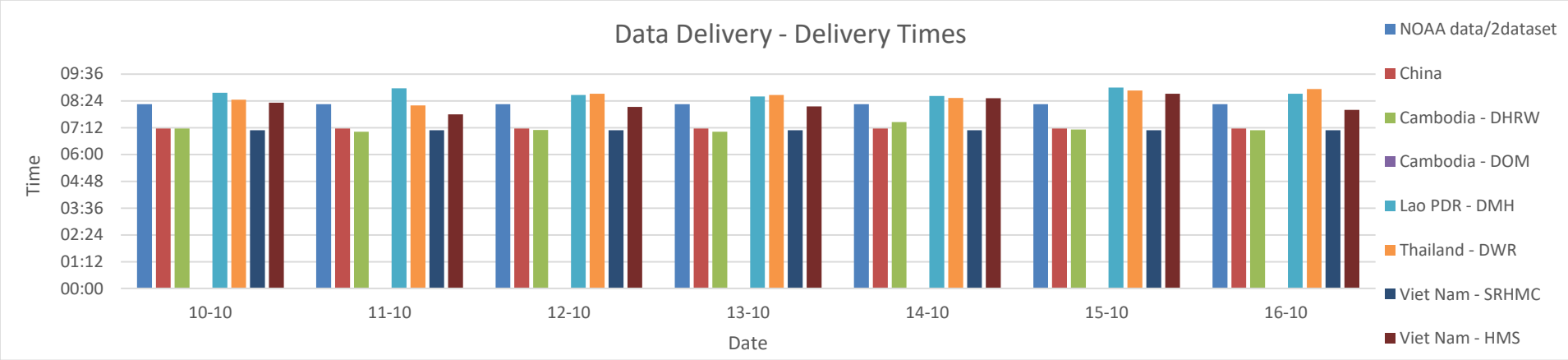


Fig. B5: Missing data for the past 7 days from 10 to 16 October 2023

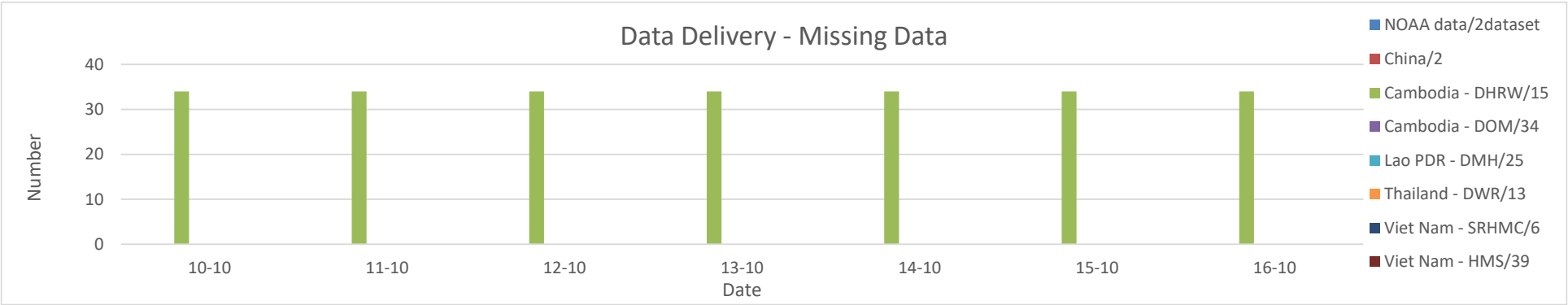
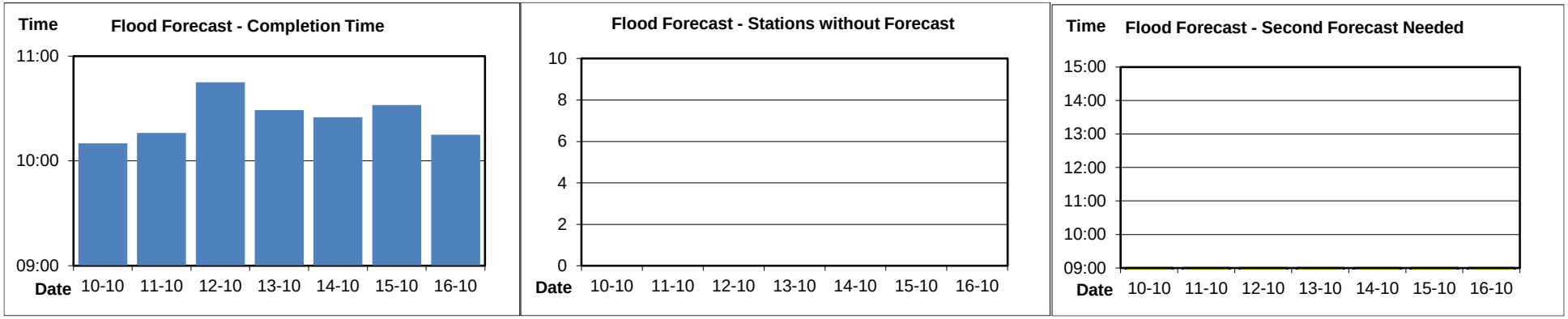


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 10 to 16 October 2023



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