Mekong River Commission

Weekly Dry Season Situation Report in the Lower Mekong River Basin

07-13 November 2023

Prepared by
The Regional Flood and Drought Management Centre
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Key Messages

Key messages for this weekly report are presented below.

Rainfall and its forecast

- During November 07-13, rainfall concentrated from Kratie to Tan Chau and Chau Doc, the lower part of the Mekong River, varied from 3.50 mm to 132.20 mm.

- The Mekong region was influenced by north-easterly monsoon wind and the high-pressure system that came across from China to the central Viet Nam with active low-pressure in the Gulf of Thailand and the South China Sea. There will be average to heavy rainfall for the next 7 days over the Mekong region from 14 to 20 November 2023.

Water level and its forecast

- The MRC's observed water level (WL) at Jinghong showed a decreased level between 535.22 m and 535.86 during 07-13 November 2023. The outflow varied from 624.00 m^3/s to 918.00 m^3/s between 07 and 13 November 2023.
- Based on the decreased outflow at Jinghong upstream, water level of monitoring station at Chiang Saen in Thailand went down about 0.01 m during the reporting period and stayed 1.59 m below its LTA, considered low level. WLs at the monitoring stations at Chiang Khan in Thailand decreased about 1.13 m, staying 1.02 m below its LTA value, while at Vientiane in Lao PDR it decreased about 1.11 m and stayed about 0.56 m lower than its LTA value. The current WL at Nong Khai in Thailand was about 1.33 m lower than its LTA value, while at Paksane in Lao PDR it was about 1.53 m lower than its LTA level, which considered normal level based on the PMFM's indicators. WLs from Thailand's Nakhon Phanom to Pakse decreased between 0.48 m and 0.64 m. Water levels at these stations are staying lower than their LTA value, except water levels at Pakse which is still about 0.30 m higher than their LTA value. Water levels from the stretches of the river at Stung Treng is about 0.07 m lower than its LTA value, while at Kratie in Cambodia, moreover, is 0.03 m lower than its LTA value due to contributed inflows and some rainfall from the upstream part (at Pakse and 3S area in Viet Nam). WL at Kompong Cham is about 0.40 m lower than its LTA value.
- The water volume of the Tonle Sap Lake was slightly lower than its LTA (about 97%) up to 13 November 2023, considered normal.
- The current water levels for most of the stations are below their LTA value, except at Luang Prabang, Pakse and Koh Khel. Water levels at the 2 tidal stations at Tan Chau and Chau Doc fluctuated between their LTA and minimum values, during this monitoring period.
- Over the next seven days, the water levels across most monitoring stations are expected to go down and will continue lower than their long-term average value in most stations.

Drought condition and its forecast

- During Nov 6-12, the LMB was facing moderate drought in certain areas of Phongsaly and Borikhamxay of Laos in the north, Ratana Kiri of Cambodia in the south, and Gia Lai and Dak Lak of Viet Nam in the south of the region. Abnormally dried soil moisture was the main cause of the drought phenomenon.
- December is expected to bring moderate to severe drought conditions to certain areas in the north and south of the LMB, including Chiang Mai, Chiang Rai, Phayao, Xayaburi, Vientiane, Xaysomboun, Otdar Meanchey, Preah Vihear, and Siem Reap. January is forecasted to see severe drought in parts of Siem Reap and Kalasin, and moderate drought in Maha Sarakham, Surin, Nakhon Phanom, and Si Saket. February 2024, however, is not expected to have any drought in the LMB area. The forecast system does not yet detect the drought conditions in the Mekong Delta. The forecasting results will be updated monthly; however, the Mekong Delta may face double impacts of low flow and salinity intrusion for the dry season of 2024.

1 Introduction

This Weekly Dry Season Situation Report presents a preliminary analysis of the weekly hydrological situation in the Lower Mekong River Basin (LMB) for **07-13 November 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 – Cambodia, Lao PDR, Thailand, and Viet Nam – and on satellite data. Water level indicated in this report refers 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
- 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 two months (November and December) and the weather maps issued by the Thai Meteorological Department (TMD) were used to verify weather conditions in the LMB.

Since the end of October 2023, the warm and wet weather have appeared because the influentially high-pressure air mass areas prevail over the LMB, with gradually decreasing water levels in both mainstream and tributaries. The data from the TMD predict that high pressure of air-mass will continue with warm weather condition in the upper part of Thailand, Lao PDR and Viet Nam. As a result, the temperature in the upper part of Thailand will drop gradually as commonly warm and cold weather, specifically at the upper portion of the northern and north-eastern parts together with cold weather in mountainous areas (within the Mekong region).

Figure 1 presents the weather map during 06-09 Nov 2023, indicating that a high-pressure cell was active in the South-Sea of Viet Nam, but not impact on the LMB. Generally, the Mekong region was influenced by north-easterly monsoon wind and the high-pressure system pushed from China until central Viet Nam with active low-pressure in the Gulf of Thailand and the South China Sea. Under this weather condition, moderate to very heavy rainfall occurred from central to southern parts of LMB, especially over southern Lao PDR, most parts of Cambodia, and central to southern parts of Viet Nam.

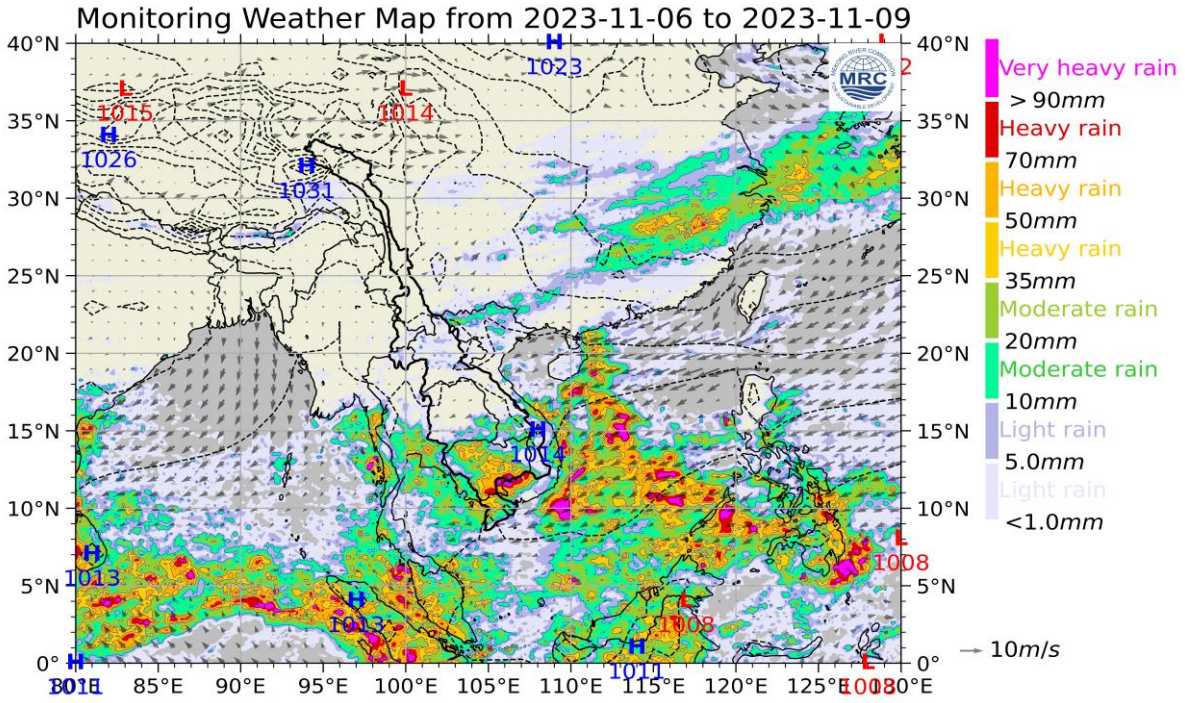


Figure 1: Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), a highest probability of wet and dries conditions are predicted over the lower part of the Mekong region covering Lao PDR and Thailand from 13 to 26 Nov 2023. **Figure 2** shows the outlook of weather condition

from 13 to 26 Nov in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

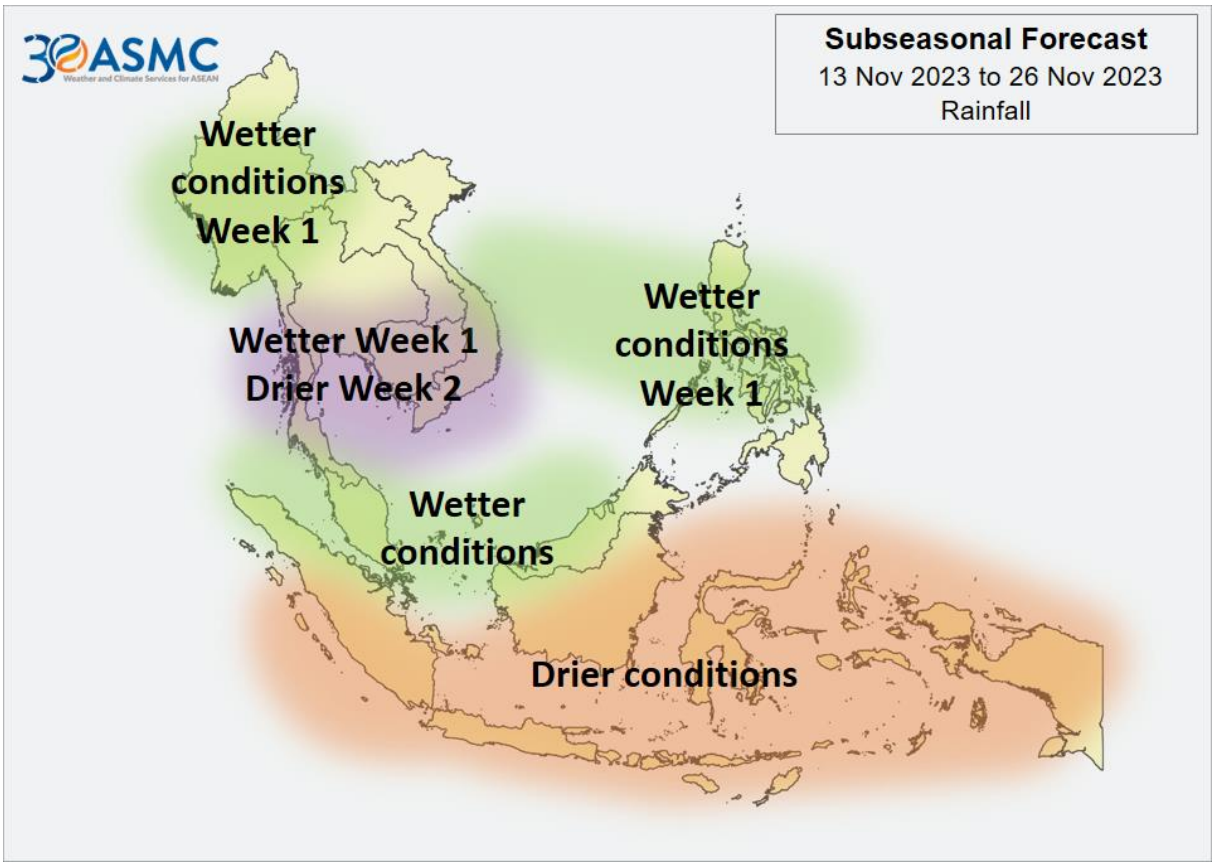


Figure 2: Outlook of wet and dry conditions over the Asian countries by ASMC.

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

There was a tracking storm covering the LMB during 07-13 November 2023, showing no low-pressure line over the LMB. No movement of storm was detected over Viet Nam, as displayed in Figure 3.

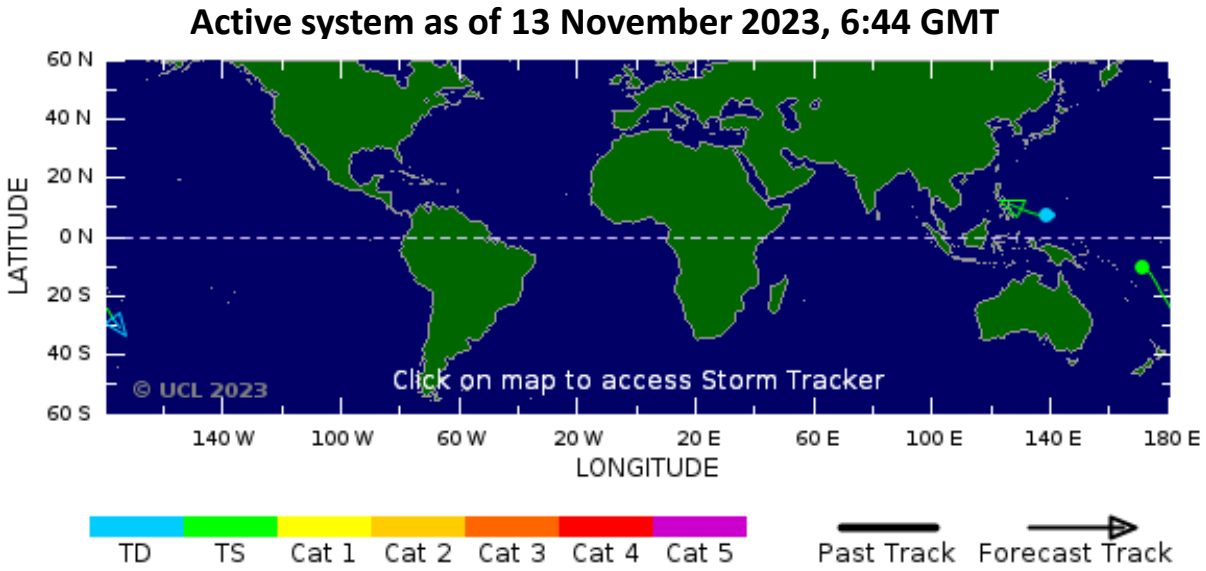


Figure 3: No tropical storm risk observed on 13 November 2023.

Rainfall patterns over the LMB

This week from 07 to 13 Nov 2023, rainfall was observed from Chiang Saen to Pakse, and from Stung Treng to Tan Chau and Chau Doc along the Mekong River of the Lower Mekong Basin (LMB), varied between 3.40 mm and 132.80 mm. This week rainfall was concentrated from Kratie to Tan Chau and Chau Doc. The highest rainfall was observed at Neak Luong in Cambodia. 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.

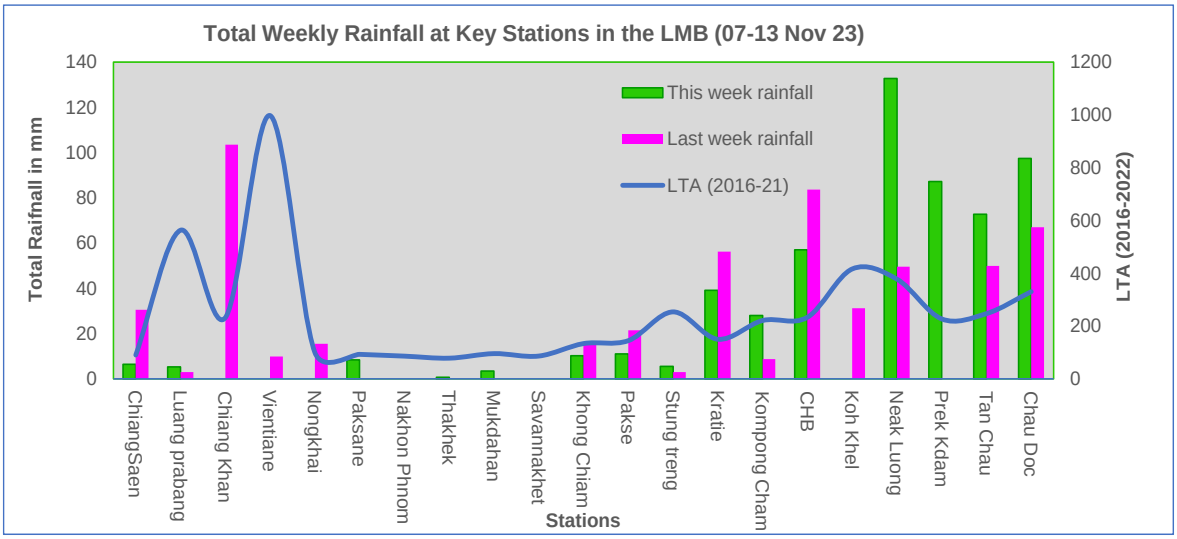


Figure 4: Weekly total rainfall at key stations in the LMB during 07-13 Nov 2023

To verify area rainfall distribution, Figure 5 shows a map of the weekly accumulated rainfall based on the observed data provided by the MRC Member Countries – Cambodia, Lao PDR, Thailand, and Viet Nam – from 07 to 13 November2023.

Absence of rain this week at some parts in the LMB is an indication of the nearly end of the rainy season in the LMB.

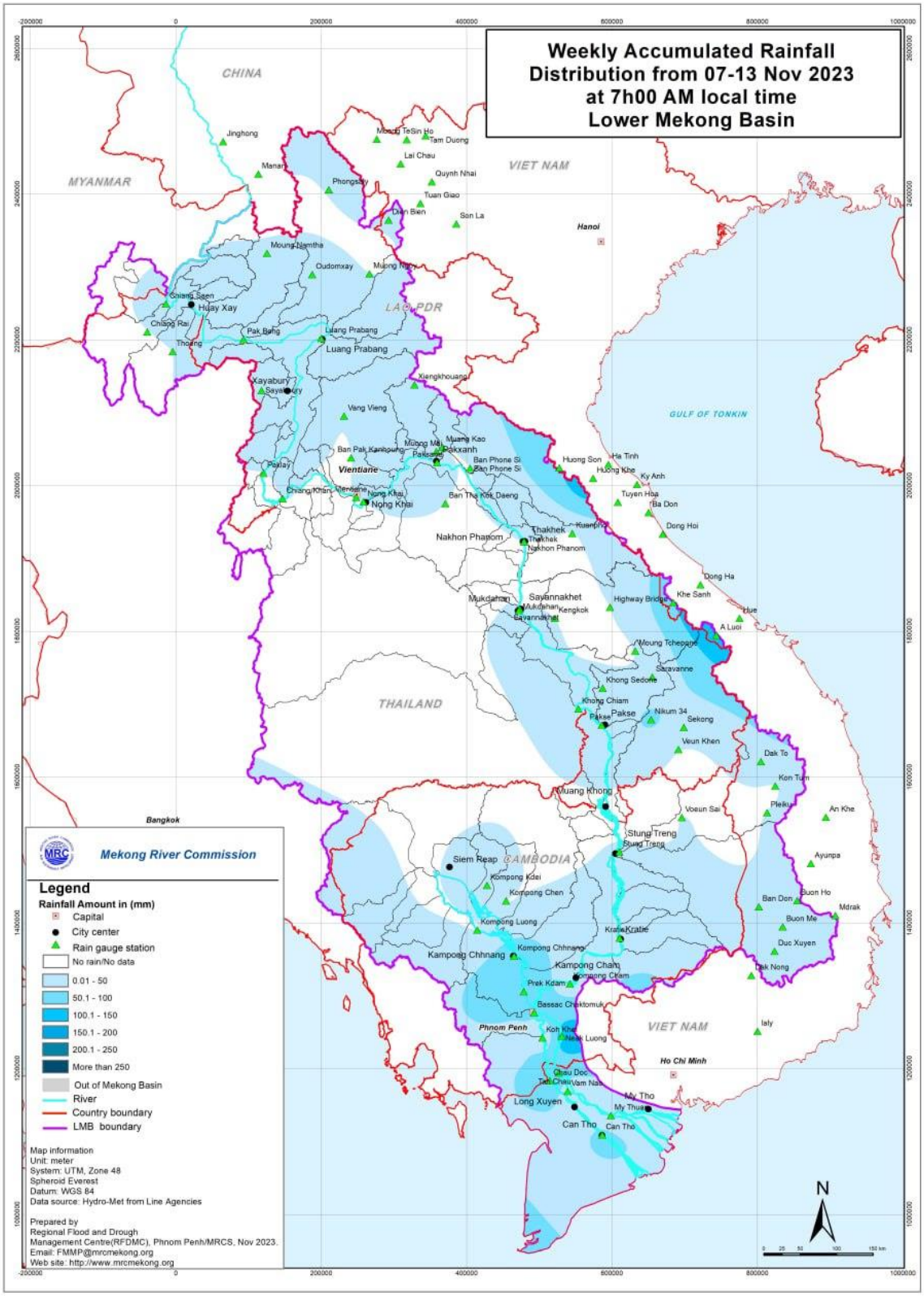


Figure 5: Weekly rainfall distribution over the LMB during 07-13 Nov 2023

3 Water Levels in the Lower Mekong River

The hydrological regimes of the Mekong mainstream are illustrated by recorded water levels and flows at key mainstream stations: at Chiang Saen to capture mainstream flows entering from the Upper Mekong Basin (UMB); at Vientiane to present flows generated by climate conditions in the upper part of the LMB; at Pakse 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**.

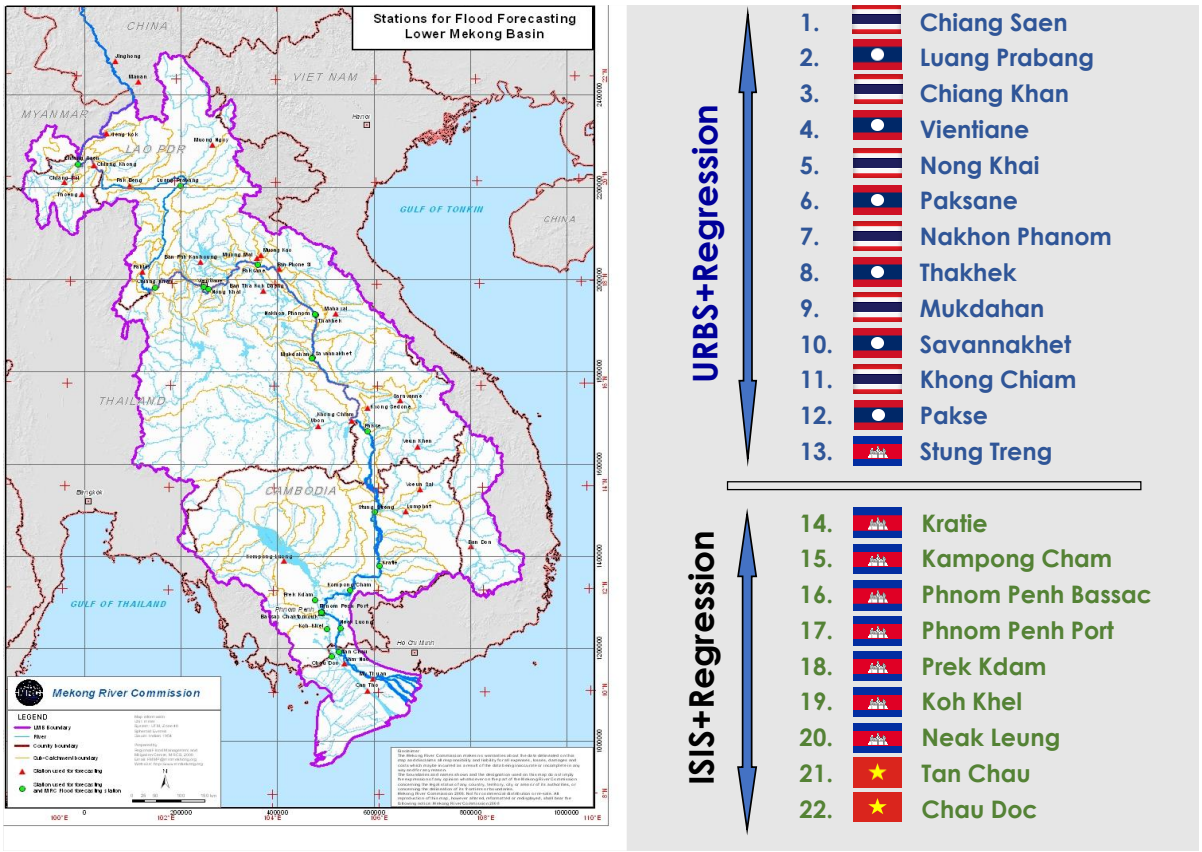


Figure 6: Key stations and model application for River Monitoring and Flood Forecasting

The MRC's observed water level (WL) at Jinghong showed fluctuated values between 535.22 m and 535.86 m from 07 to 13 November 2023 (recorded on 7:00 am). The outflow varied from 624.00 m^3/s to 918.00 m^3/s between 07 and 13 November 2023.

Figure 7 below presents water level that decreased at the Jinghong hydrological station[1], indicating the trend of fluctuating water level up to 13 November 2023.

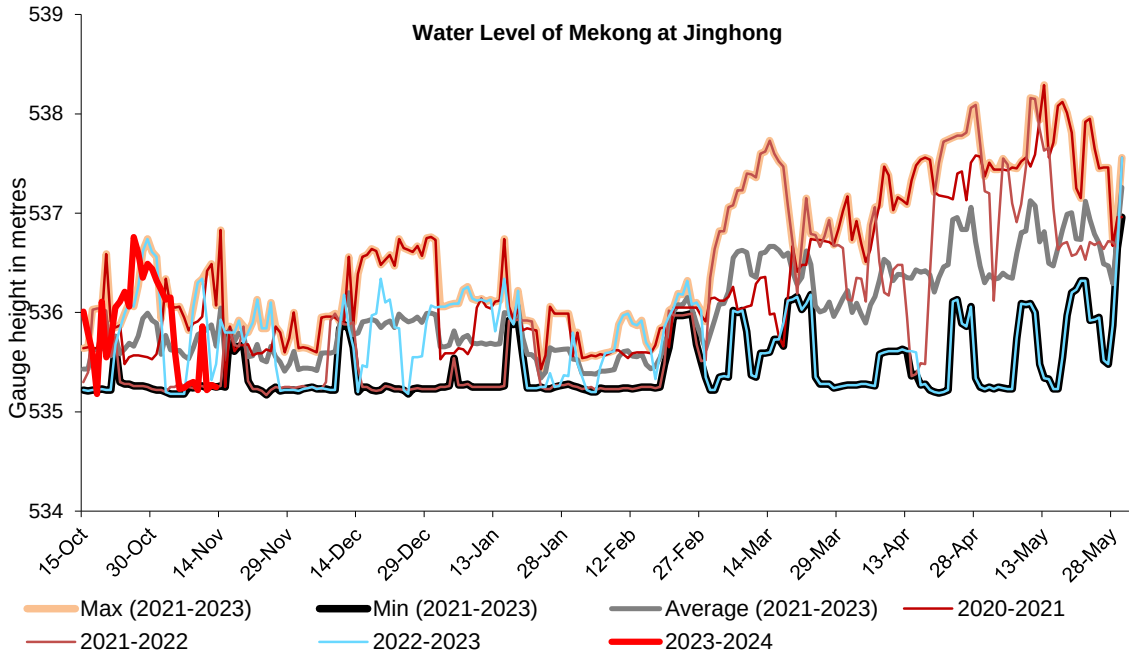


Figure 7. Water level at the Jinghong hydrological station during 07-13 November 2023.

Regardless the fluctuated outflow from Jinghong upstream, water level of monitoring station at Chiang Saen in Thailand decreased 0.01 m (nearly stable) from 07 to 13 November 2023 and stayed about 1.59 m lower than its long-term average (LTA), which considered low level. WLs at the monitoring station at Chiang Khan in Thailand significantly decreased about 1.13 m and stayed 1.02 m lower than its LTA, while at Vientiane in Lao PDR it notably decreased about 1.11 m and stayed about 0.56 m lower its LTA value, considered low water levels. The current water levels at Nong Khai in Thailand, however, decreased 1.11 m but stayed 1.33 m lower than its LTA, while at Paksane in Lao PDR it decreased about 0.72 m and stayed 1.53 m lower than its LTA value. WLs at these stations were considered normal based on the PMFM indicators. Water levels from Nakhon Phanom to Pakse decreased between 0.48 m and 0.64 m. Water levels at these stations are staying below their LTA value, except at Pakse the water levels are about 0.30 m higher than their LTA value. Water levels from the stretches of the river from Stung Treng to Kratie in Cambodia were decreasing by 0.34 m and 0.69 m respectively. The water levels at Kompong Cham decreased about 0.50 m due to low inflow and less rainfall from the upstream part. WLs at Stung Treng stayed about 0.07 m lower than its LTA value and at Kratie it was 0.03 m lower than its LTA value, respectively. WL at Kompong Cham was about 0.40 m lower than its LTA value.

Based on hydrological phenomenon, the contribution of inflow water from the upstream of Lancang-Mekong in China to the Mekong mainstream is about 16% in total during the wet

[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.

season from June to October and about 25% in total during the dry season from November to May. 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

Water level during 07-13 November 2023 at Thailand's Chiang Saen decreased from 2.26 m to 2.25 m, staying about 1.59 m lower than its Long-Term-Average (LTA), which is considered low level. When compared to last week, this week's water level is relatively lower.

Water level at the Luang Prabang station in Lao PDR decreased from 9.72 m to 9.06 m, during the reporting period. Compared to last week, the figure shows it is down about 0.66 m. The water level at this station was 1.32 m higher than its LTA value and staying about 1.14 m below its historical maximum value. 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 dry season**.

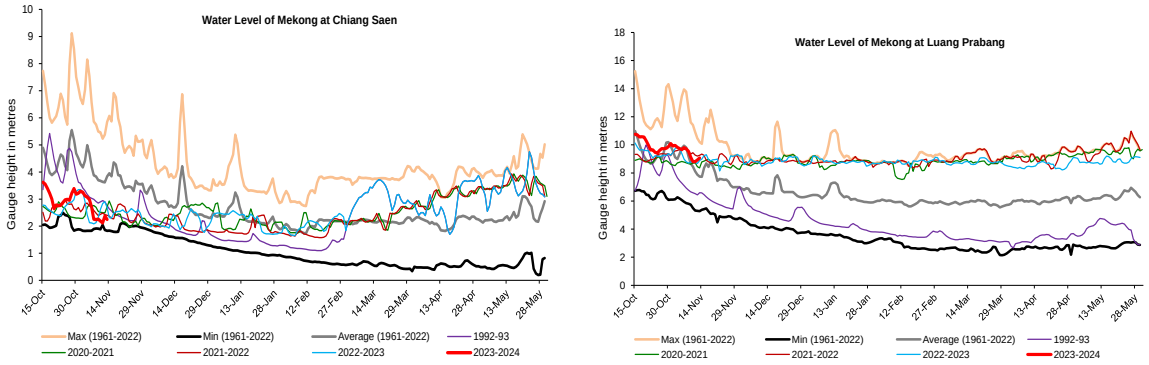


Figure 8. Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) decreased about 1.13 m, during the reporting week. It showed 1.02 m below its LTA. Moreover, the water level downstream at Vientiane in Lao PDR decreased from 4.76 m to 3.65 m and stayed about 0.56 m lower than its LTA during 07-13 November 2023. At Nong Khai station in Thailand, the water level decreased about 1.11 m during the reporting period. It showed 1.33 m lower than its LTA value, which still considered normal water level (based on PMFM indicator). At Paksane in Lao PDR, water level decreased about 0.72 m staying about 1.53 m lower than its LTA value. The recently decreased water levels were obviously due to low rainfall and inflow from upstream and water operation from upstream in the sub-catchment area. The water levels at Vientiane and Paksane are shown in Figure 9 below.

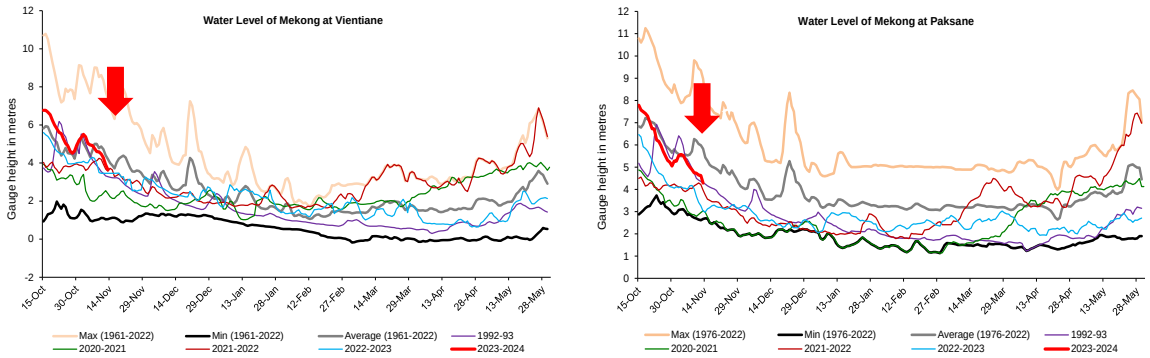


Figure 9. Water levels Vientiane and Paksane in Thailand and Lao PDR.

Nakhon Phanom to Pakse

Moreover, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR decreased between 0.48 and 0.64 m. Water levels for most of the stations are staying lower to their LTA levels except at Pakse which water levels are still 0.30 m above their LTA value. Figure 10 shows the water levels at Nakhon Phanom and Pakse stations.

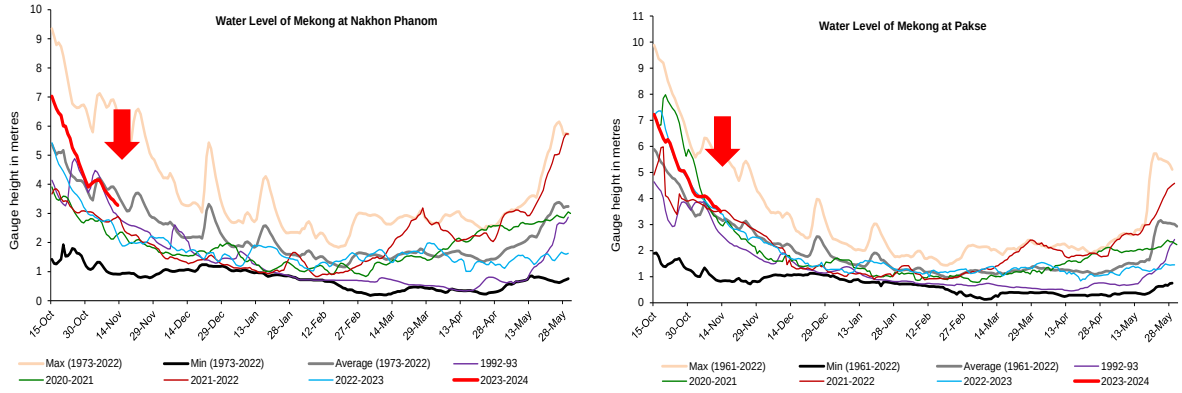


Figure 10: Water levels at Nakhon Phanom and Savannakhet of Thailand and Lao PDR.

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

Due to the fact that there was low 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 decreasing during 07-13 November 2023, respectively. The water level at Stung Treng decreased about 0.34 m, while at Kratie it decreased about 0.69 m. Water levels at Stung Treng is staying about 0.07 m lower than its LTA value and at Kratie is about 0.035 m lower than its LTA value. Water levels at these two stations were considered normal during the starting dry season (as showed in Figure 11).

This week, the water levels at Kompong Cham were down about 0.50 m and stayed 0.40 m below its LTA value, which considered low.

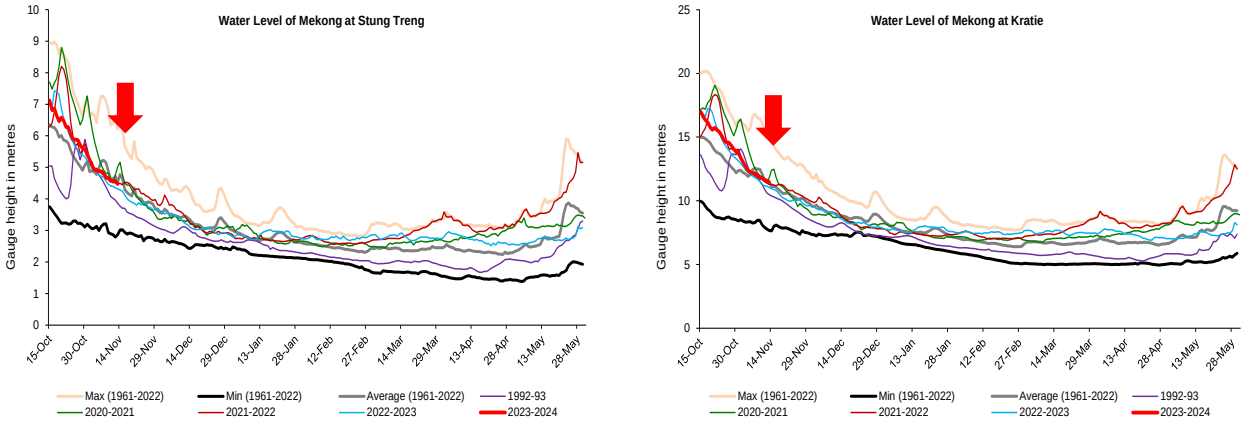


Figure 11: Water levels at Stung Treng and Kratie on the Mekong River.

At Chaktomuk on the Bassac River, the water level was down by about 0.37 m and stayed 0.48 m lower than its LTA value; while at Koh Khel, water level decreased about 0.30 m, staying 0.34 m higher than its LTA value. It was observed that the WLs at Koh Khel and Neak Luong were affected by tidal from downstream stations of Tan Chau and Chau Doc in Viet Nam, during the dry season period. However, water level at Prek Kdam on the Tonle Sap Lake decreased about 0.34 m and stayed about 0.11 m higher than its LTA value. The water level at the Tonle Sap Lake (observed at Kompong Luong) was similar to Prek Kdam station's water level. The recently decreased water level was due to less rain 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 Kompong Luong) followed the same trend of Prek Kdam station's water level. Water levels at these stations were mostly staying lower than their LTA level, which still considered normal water level.

Tidal stations at Tan Chau and Chau Doc

Like last week, the water levels from 07 to 13 November 2023 at Viet Nam's Tan Chau and Chau Doc were fluctuating between their LTA and minimum values due to daily tidal effects from the sea. The fluctuated levels were between 2.21 m and 2.36 m, which were lower than their LTA level, which considered normal at this stage.

The Tonle Sap Flow

At the end of the wet season, when water levels along the Mekong River subside, the outflows of the Tonle Sap Lake return to the Mekong River and then to the Delta. This phenomenon normally takes place between September and October. Based on flow observation at Prek Kdam, the outflow of the Tonle Sap Lake took place since 23 October 2023.
The flows of the Tonle Sap Lake were calculated based on a formula of rating-curves using 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 inflow/reverse flow and the outflow of the TSL at Prek Kdam in comparison with the flows of 2019, 2021 and 2022, and their LTA level (1997-2022). Up to November 13 of this reporting period, **it was observed that the main outflow to Tonle Sap Lake increased due to average rainfall and inflows from upstream**. This increased outflow of Tonle Sap Lake was most likely caused by inflows and rainfall from the catchment area. Up to this date, the outflow from the Tonle Sap Lake condition in 2023 is higher than 2020, 2021 and 2022 outflow conditions. It is noted that the outflow in early 2023 is still slightly higher than its LTA up to 13 November 2023. For next week, low-average rainfall is forecasted for the Tonle Sap area; thus, the outflow into the Tonle Sap Lake is likely to slightly decrease from the current level.

Figure 13 shows seasonal changes in monthly flow volumes up to 13 November 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 13 November 2023, **the water volume of the Tonle Sap Lake was staying slightly lower than its LTA (about 97%) and higher than 2020, 2021, 2022 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 Mekong River and its tributaries and rainfall in the surrounding sub-catchments and ***considered normal***.

This demonstrates the influence of the relationships between the reverse 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.

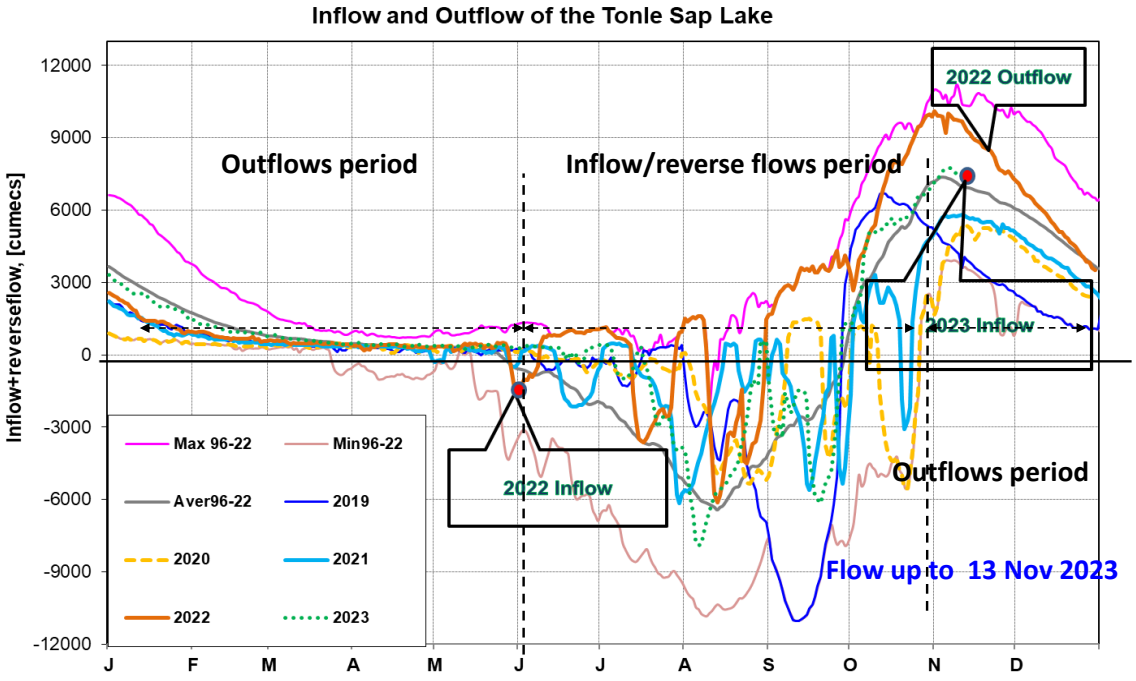


Figure 12: Seasonal change of inflows and outflows of Tonle Sap Lake.

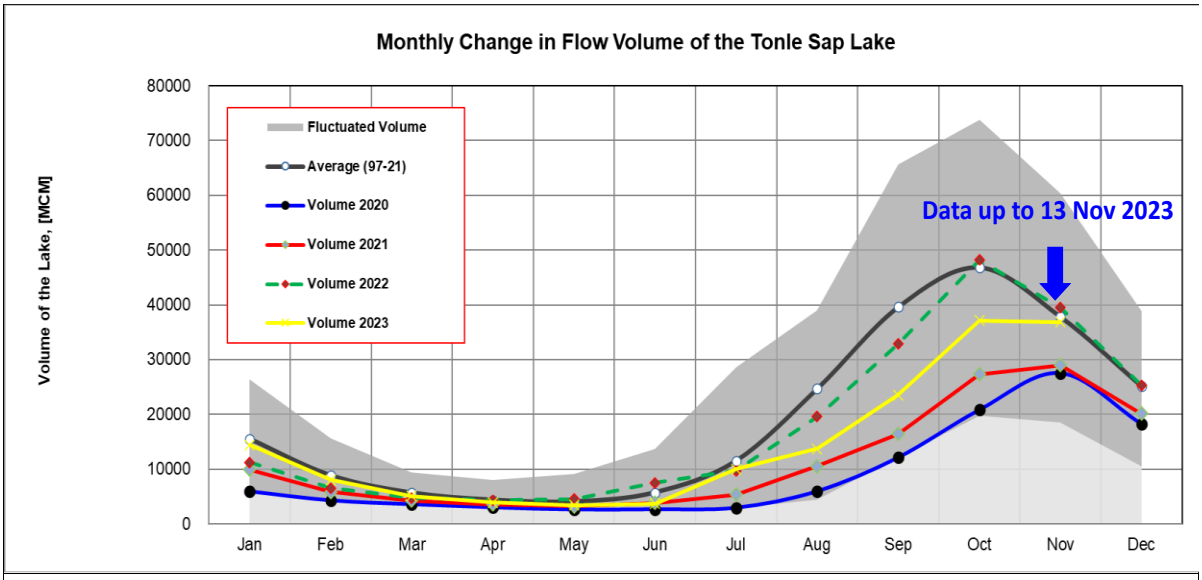


Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.

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	37141.40	79.24
Nov	37823.16	60367.33	18534.61	19112.65	27546.80	28982.93	39452.53	36831.08	97.38
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 November 07 to 13, 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, flash flood events were not detected during the reporting period over the LMB.

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from 6 to 12 November 2023

Drought monitoring data for 2023 are available from Monday to Sunday every week; thus, the reporting period is normally delayed by one day 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)**

Meteorological drought condition of the LMB from Nov 6 to 12, as shown in Figure 11, was relatively wet especially in the central and lower parts. No meteorological drought threat was detected during the monitoring week.

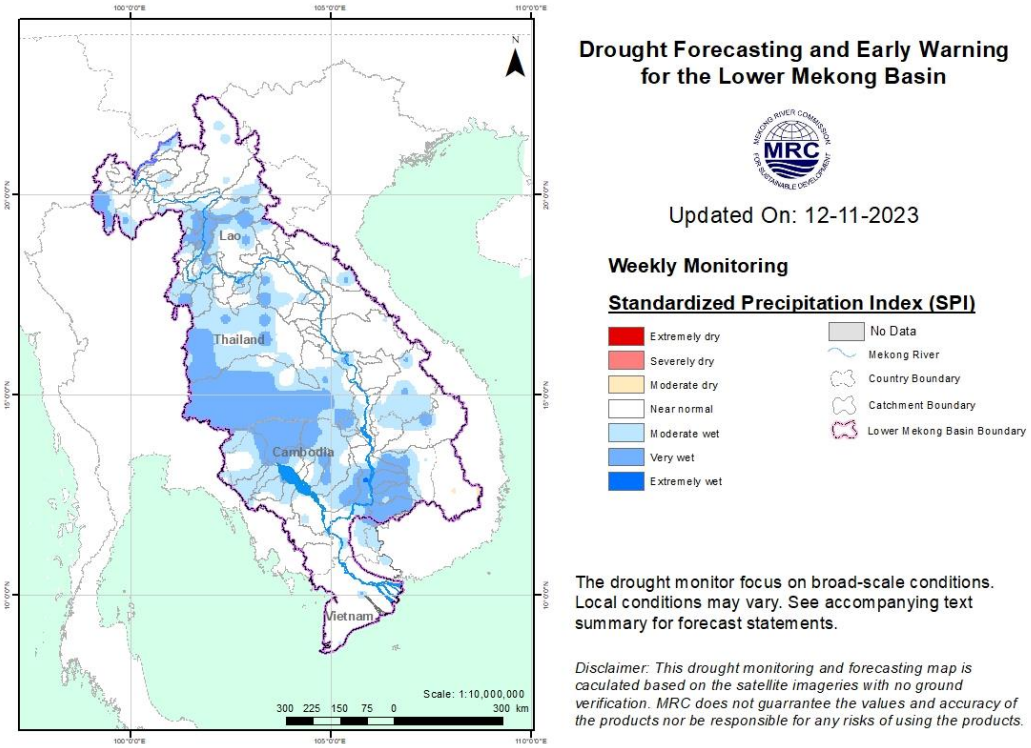


Figure 14: Weekly standardised precipitation index from Nov 6 to 12.

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

Soil moisture conditions from Nov 6 to 12, as displayed in Figure 12, were mainly dry in some areas in the north, north-east, and south-east. The risk areas are listed in the table below.

Note: The index of soil water fraction presents the current soil water fraction conditions compared with normal month; therefore, it normally shows extremely dry during dry season which is completely different from SPI that is standardized to its specific month of the years. However, this does not mean that the areas are threatened by agricultural drought as

generally during transition period of wet and dry seasons and dry season only the irrigated areas are used for agricultural plantation.

Number	Country	Province	Mderate	Severe	Extreme
1	Cambodia	Preah Vihear	Yes		
2	Cambodia	Stung Treng	Yes	Yes	
3	Cambodia	Ratana Kiri	Yes	Yes	
4	Cambodia	Kratie	Yes		
5	Cambodia	Mondul Kiri	Yes		
6	Laos	Phongsaly	Yes	Yes	
7	Laos	Xiengkhuang	Yes	Yes	
8	Laos	Xaysomboun	Yes	Yes	
9	Laos	Borikhamxay	Yes	Yes	
10	Laos	Vientiane	Yes	Yes	
11	Laos	Khammuane	Yes	Yes	
12	Laos	Savannakhet	Yes	Yes	
13	Laos	Champasack	Yes		
14	Thailand	Nong Khai	Yes	Yes	
15	Thailand	Sakon Nakhon	Yes	Yes	
16	Thailand	Nakhon Phanom	Yes	Yes	
17	Thailand	Mukdahan	Yes	Yes	
18	Thailand	Udon Thani	Yes		
19	Thailand	Kalasin	Yes		
20	Thailand	Roi Et	Yes		
21	Thailand	Yasothon	Yes		
22	Thailand	Burirum	Yes		
23	Thailand	Surin	Yes		
24	Thailand	Amnat Charoen	Yes		
25	Thailand	Roi Et	Yes		
26	Vietnam	Gia Lai	Yes	Yes	
27	Vietnam	Dak Lak	Yes	Yes	
		Moderate		Extreme	
		Severe		No drought	

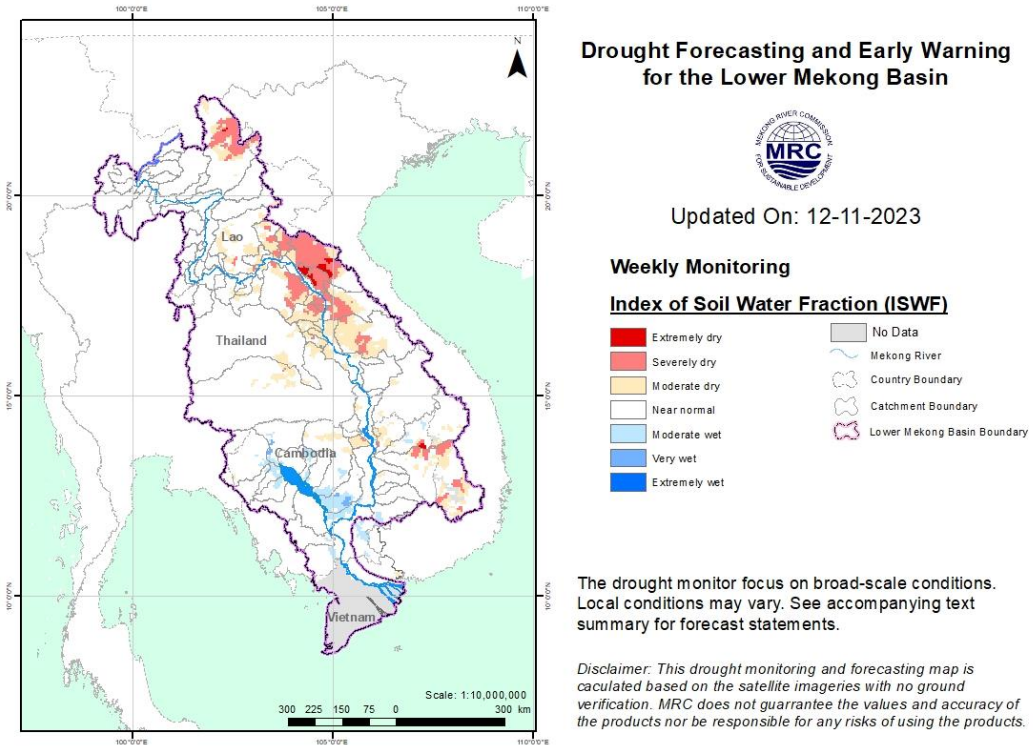


Figure 15: Weekly Index of Soil Water Fraction from Nov 6 to 12.

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

With the wet conditions of the meteorological indicator, the combined drought indicator (displayed in Figure 13) reveals that during Nov 6-12, the LMB was facing moderate drought in certain areas of Phongsaly and Borikhamxay of Laos in the north, Ratana Kiri of Cambodia in the south, and Gia Lai and Dak Lak of Viet Nam in the south of the region. Abnormally dried soil moisture was the main cause of the drought phenomenon.

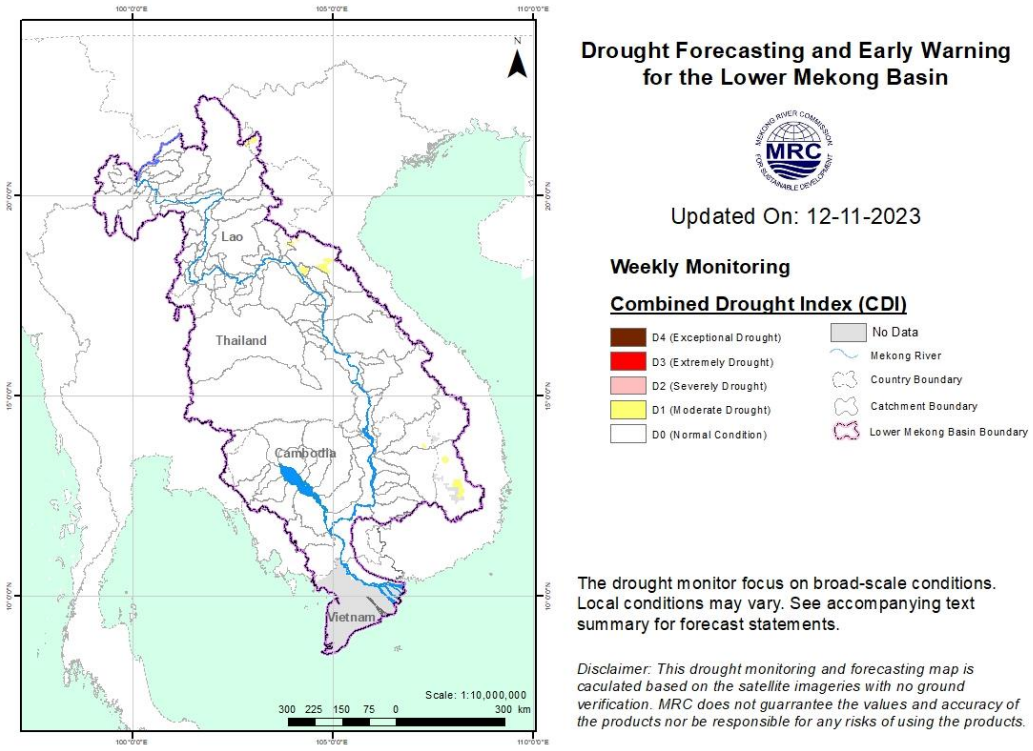


Figure 16: Weekly Combined Drought Index duing Nov 6-12.

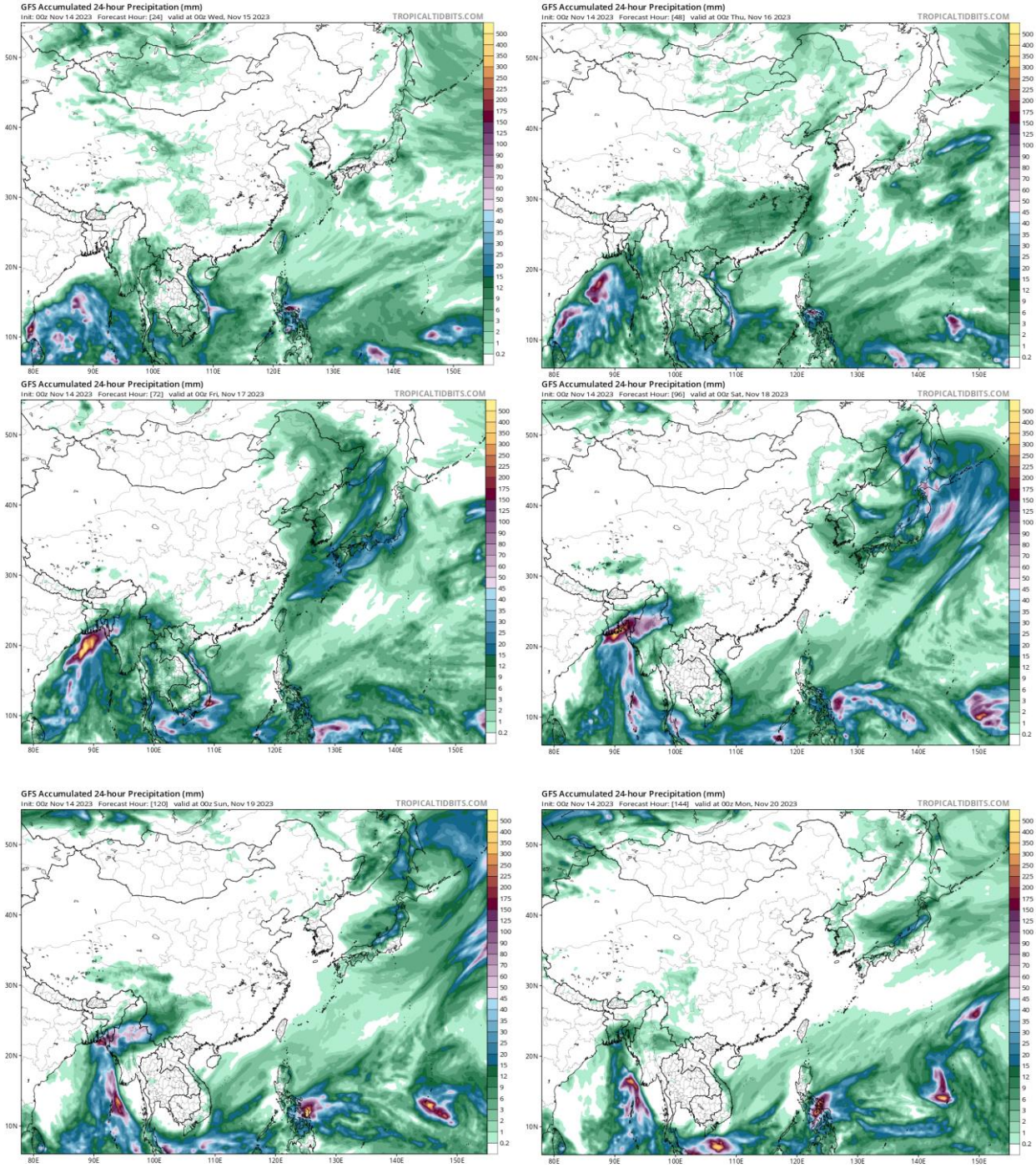
More information on Drought Forecasting and Early Warning (DFEW) as well as the explanation is available here: http://droughtforecast.mrcmekong.org/templates/view/our-product. DFEW provides not only weekly monitoring and forecasting information but also a three-month forecast of drought indicators with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

Based on the result of the Global Forecast System (GFS) model, light to heavy rain (5-70 mm/24h) and isolated thundershowers are likely taking place in some areas of the LMB.

Figure 17 shows accumulated rainfall forecast (24hrs) of the GFS model during 15 – 21 November 2023.



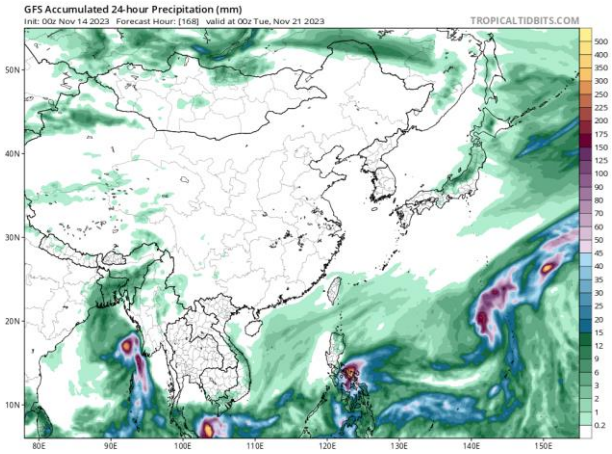


Figure 17: Accumulated rainfall forecast (24 hrs) of model GFS.

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on November 13's weekly river monitoring bulletin, the weekly forecast water level at Chiang Saen in Thailand is expected to increase from 2.25 m to 2.34 m in the next seven days. The trend of water levels at these stations will continue staying below its LTA.

For Luang Prabang in Lao PDR, the water level is likely increasing about 0.22 m during the same period. The current water level is about 1.32 m higher than its LTA and staying about 1.14 m lower than its historical maximum value. Next week low-average precipitation is forecasted in the area.

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Chiang Khan station in Thailand is forecasted to be down about 0.16 m for the next seven days. At Vientiane in Lao PDR and Nong Khai in Thailand WLs will be also down in between 0.40 m and 0.50 m in the next seven days. At Paksane in Lao PDR, water level will decrease about 0.69 m due to some effect of low inflows from the upper catchments. Low to average rainfalls are forecasted in the area due to air pressure dominating in the upper sub-catchments. The water levels here will continue lower than their LTA.

Nakhon Phanom to Pakse

Water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR will decrease from 0.60 to 1.00 m. Water levels at these stations will stay lower than their LTA levels. Next week some precipitation is forecasted in the area.

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

From Stung Treng on the Mekong River in Cambodia, the water level will likely go down about 0.61 m, while at Kratie it will be down about 0.87 m over the next seven days. For Kompong

Cham, the WL will be down about 0.65 m and stay below than its LTA. Average to heavy rainfall 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 down between 0.29 m and 0.47 m over the next seven days.

Water levels at more than half of the stations will continue to stay lower than their LTA value, particularly in the lower part of the region from the Bassac in Phnom Penh to Koh Khel as well as from Tonle Sap in Prek Kdam to Phnom Penh Port, including the Tonle Sap Lake. Average to heavy rainfall 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, water levels will be moving down between their LTA and minimum values following daily tidal effects from the sea.

Table 3 shows the weekly River Monitoring Bulletin issued on November 13. Results of the started weekly river monitoring bulletin are also available at http://ffw.mrcmekong.org/bulletin_wet.php. Tables for weekly updated water levels and rainfall at the Key Stations are presented in **Annex A**.

6.3 Flash Flood Information

Flash flood events are not likely to happen in the LMB next week. However, local heavy rain in a short period of time might still be possible with unexpected short flash floods. During the dry season if extreme weather occurs, the information on flash flood guidance for the next one, three, and six hours is updated at http://ffw.mrcmekong.org/ffg.php.

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

6.4 Drought forecast

There are several climate-prediction models with different scenarios in the upcoming months. The MRC's DFEWS adopts an ensemble model called the North America Multi-Model Ensemble (NMME) with a downscaling mothed to 5km resolution.

Figure 18 below shows the Combined Drought Indicator (CDI) forecast for December 2023, January and February 2024 over the LMB area.

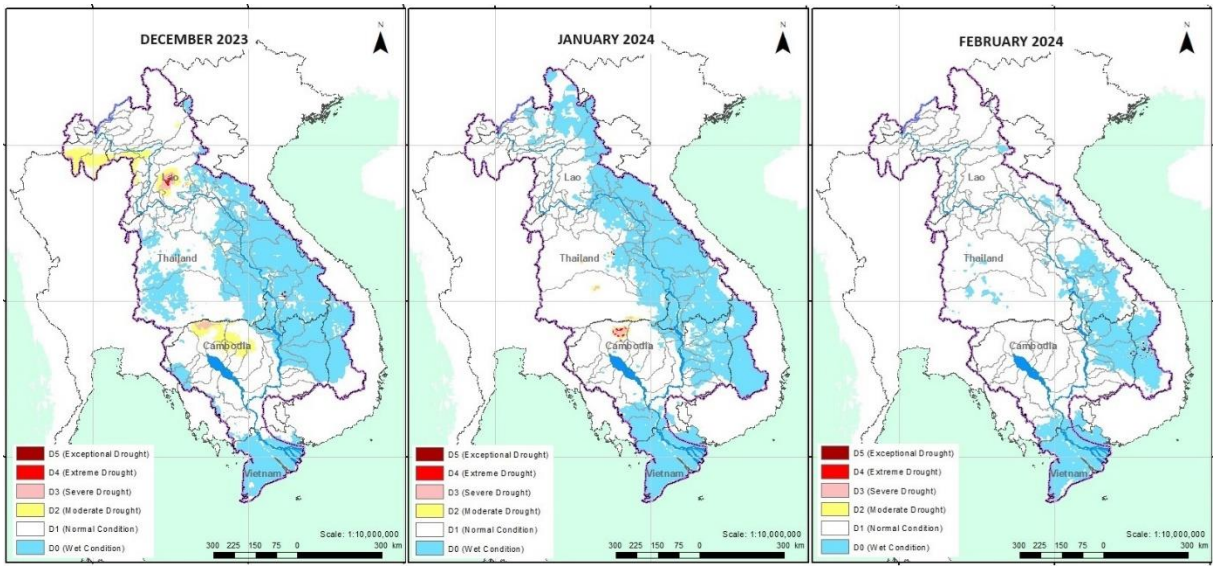


Figure 18. Monthly forecast of CDI for Dec 2023, Jan and Feb 2024.

Figure 18 above shows that in December it is expected to bring moderate to severe drought conditions to certain areas in the north and south, including Chiang Mai, Chiang Rai, Phayao, Xayaburi, Vientiane, Xaysomboun, Otdar Meanchey, Preah Vihear, and Siem Reap. January is forecasted to see severe drought in parts of Siem Reap and Kalasin, and moderate drought in Maha Sarakham, Surin, Nakhon Phanom, and Si Saket. February 2024, however, is not expected to have any drought in the LMB area.

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

Forecast period from: 14 November to 20 November 2022

Date: 13 November 2022

LOCATION	Country	Observed Rainfall (mm)	Zero gauge above M.S.L (m)	Min water level against zero gauge (m)	Observed W. level against zero gauge (m)		Forecasted Water Levels (m)						
		07-Feb			12-Nov	13-Nov	14-Nov	15-Nov	16-Nov	17-Nov	18-Nov	19-Nov	20-Nov
Jinhong		29.5	-	-	535.27	535.25							
Chiang Saen		32.0	357.110	0.00	2.37	2.25	2.22	2.20	2.14	2.20	2.25	2.30	2.34
Luang Prabang		0.0	267.195	2.53	8.92	9.06	9.31	9.25	9.22	9.20	9.16	9.22	9.28
Chiang Khan		0.0	194.118	1.91	5.92	5.76	5.64	5.70	5.65	5.63	5.60	5.56	5.60
Vientiane		0.0	158.040	-0.28	3.92	3.65	3.45	3.30	3.34	3.30	3.26	3.23	3.20
Nongkhai		0.0	153.648	0.33	3.24	2.92	2.68	2.50	2.52	2.50	2.46	2.42	2.40
Paksane		0.0	142.125	0.10	4.62	4.29	4.00	3.83	3.70	3.67	3.65	3.63	3.60
Nakhon Phanom		0.0	130.961	0.18	3.35	3.28	2.92	2.63	2.50	2.40	2.37	2.35	2.33
Thakhek		0.0	129.629	1.38	4.55	4.47	4.10	3.80	3.67	3.56	3.53	3.50	3.47
Mukdahan		0.0	124.219	0.72	3.42	3.38	3.30	3.10	2.97	2.89	2.82	2.80	2.78
Savannakhet		0.0	125.410	-0.65	2.03	1.83	1.60	1.45	1.35	1.30	1.25	1.23	1.21
Khong Chiam		0.0	89.030	1.02	4.95	4.86	4.80	4.70	4.48	4.33	4.23	4.14	4.10
Pakse		0.0	86.490	0.03	3.60	3.50	3.43	3.32	3.13	3.00	2.94	2.88	2.85
Stung Treng		nr	36.790	0.32	4.56	4.47	4.36	4.28	4.20	4.05	3.95	3.91	3.86
Kratie		nr	-1.080	3.06	11.59	11.47	11.30	11.18	11.07	10.96	10.78	10.65	10.60
Kompong Cham		nr	-0.930	0.65	7.13	7.10	6.99	6.85	6.78	6.70	6.63	6.53	6.45
Phnom Penh (Bassac)		nr	-1.020	1.58	5.89	5.84	5.78	5.70	5.66	5.61	5.57	5.52	5.47
Phnom Penh Port		-	0.000	0.14	4.89	4.77	4.68	4.58	4.50	4.44	4.40	4.35	4.30
Koh Khel		nr	-1.000	1.52	5.42	5.40	5.34	5.26	5.20	5.15	5.12	5.07	5.03
Neak Luong		nr	-0.330	0.81	4.29	4.23	4.18	4.12	4.05	4.02	4.00	3.97	3.94
Prek Kdam		nr	0.080	0.58	5.98	5.93	5.87	5.80	5.73	5.68	5.64	5.60	5.57
Tan Chau		0.0	0.000	-0.37	2.33	2.31	2.28	2.25	2.22	2.19	2.16	2.14	2.11
Chau Doc		nr	0.000	-0.60	2.36	2.34	2.32	2.30	2.27	2.24	2.21	2.19	2.15

REMARKS:

-: not available.
*: reference stations without forecast.
nr: no rain.

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

This week, rainfall was observed from Chiang Saen to Pakse station and from Stung Treng to Tan Chau and Chau Doc along the Mekong River were varied between 3.50 mm and 132.80 mm. The highest rainfall was observed at Chiang Khan station. Compared with last week's amount, the rainfall this week was considered high in the lower part of the Mekong region.

Based on the forecasted satellite data, rainfall is forecasted for some areas of the LMB with the value range from 10.00 mm to 150.00 mm for the next seven days. The forecasting model using CHIRPS-GEFS data, moreover, shows average rainfall (>100 mm) is likely to take place in the Mekong region from 14 to 20 November 2023.

7.2 Water level and its forecast

The MRC's observed water level (WL) at Jinghong showed a decreased level from 535.22 m to 535.86 m between 07 and 13 November 2023 (recorded on 7:00 am) while the outflow varied from 624.00 m^3/s to 918.00 m^3/s between 07 and 13 2023.

Mekong water levels this week remain as normal condition based on the PMFM indicators—with 3 out of 22 stations have water levels higher than their long-term average. In general, this hydrological condition is influenced by the inflows from the upper Mekong River in China and dam operations in the tributaries of the Lower Mekong River Basin.

Stay updated with our river monitoring and forecasting to better prepare for flood and drought events. Find more details at https://www.mrcmekong.org/.

Up to 13 November 2023, the flow volume of the Tonle Sap Lake is slightly lower than its LTA (about 97%). From next week, the flow is expected to be decreasing due to below-average rainfall is forecasted in the inflow catchments of the Tonle Sap Lake.

From Stung Treng to Kratie, the water levels will most likely go down, while at Kompong Cham they will also go down. The water levels – at Neak Luong on the Mekong River, from Prek Kdam to Phnom Penh Port on the Tonle Sap, and from Chaktomuk to Koh Khel on the Bassac – are forecasted to stay below their LTA.

The situation in Tan Chau on the Mekong River and Chau Doc on the Bassac River is expected to remain fluctuating. In Tan Chau and Chau Doc, the fluctuation of water levels will move lower than their LTA value during the monitoring period, which will **considered normal.**

Since the third week of October 2023, water levels across most monitoring stations in the LMB have decreased due to the low-average rainfall but still staying higher than their LTA value (at Vientiane, Khong Chiam, Pakse and Koh Khel). The preliminary analysis of the hydrological conditions in the LMB over July–December 2020 and from 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 of rainfall for the coming week as mentioned earlier in section 6.1, major flash floods are not likely to happen in the LMB.

7.4 Drought condition and its forecast

During Nov 6-12, the LMB was facing moderate drought in certain areas of Phongsaly and Borikhamxay of Laos in the north, Ratana Kiri of Cambodia in the south, and Gia Lai and Dak Lak of Viet Nam in the south of the region. Abnormally dried soil moisture was the main cause of the drought phenomenon.

In December, it is expected to bring moderate to severe drought conditions to certain areas in the north and south, including Chiang Mai, Chiang Rai, Phayao, Xayaburi, Vientiane, Xaysomboun, Otdar Meanchey, Preah Vihear, and Siem Reap. January is forecasted to see severe drought in parts of Siem Reap and Kalasin, and moderate drought in Maha Sarakham, Surin, Nakhon Phanom, and Si Saket. February 2024, however, is not expected to have any drought in the LMB area.

Annex A: Tables for weekly updated water levels and rainfall at the Key Stations

Table A1: Weekly observed water levels

2023	Jinghong	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
07/11/2023	535.28	2.26	9.72	6.89	4.76	4.03	5.01	3.82	5.02	3.86	2.45	5.50	4.05	4.81	12.16	7.60	6.21	5.14	5.70	4.57	6.27	2.23	2.22
08/11/2023	535.30	2.24	9.54	6.90	4.60	3.83	4.89	3.72	4.92	3.74	2.40	5.35	3.96	4.67	12.03	7.55	6.15	5.09	5.67	4.50	6.26	2.22	2.23
09/11/2023	535.22	2.26	9.12	6.79	4.59	3.78	4.75	3.62	4.82	3.66	2.20	5.22	3.84	4.66	11.80	7.41	6.07	5.01	5.60	4.43	6.16	2.25	2.25
10/11/2023	535.86	2.19	8.80	6.55	4.48	3.72	4.73	3.52	4.78	3.59	2.12	5.11	3.70	4.57	11.78	7.30	5.98	4.95	5.57	4.36	6.09	2.29	2.30
11/11/2023	535.22	2.12	8.80	6.15	4.28	3.56	4.65	3.46	4.63	3.50	2.10	5.03	3.68	4.57	11.65	7.24	5.93	4.91	5.49	4.30	6.02	2.28	2.30
12/11/2023	535.27	2.37	8.92	5.92	3.92	3.24	4.62	3.35	4.55	3.42	2.03	4.95	3.60	4.56	11.59	7.13	5.89	4.89	5.42	4.29	5.98	2.33	2.36
13/11/2023	535.25	2.25	9.06	5.76	3.65	2.92	4.29	3.28	4.47	3.38	1.83	4.86	3.50	4.47	11.47	7.10	5.84	4.77	5.40	4.23	5.93	2.31	2.34

Table A2: Weekly observed rainfall

2023	Jinghong	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
07/11/2023	4	0	5.2	0	0	0	0	0	0	0	0	6.2	1.8	0	0	0	0	0	0	0	0	0	0
08/11/2023	6.5	6.4	0	0	0	0	0	0	0.7	0	0	0	0	0	0	0	27.7	0	0	75.4	0	19.3	19
09/11/2023	0.5	0	0	0	0	0	8.4	0	0	0	0	3.5	0	0	0	0	0	0	0	0	57.3	0	45
10/11/2023	0	0	0	0	0	0	0	0	0	0	0	0	9.2	5.5	39.1	20	25.8	0	0	37.2	17.4	39.2	22.4
11/11/2023	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	8	2.8	0	0	20.2	7.3	14.3	7
12/11/2023	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	5.2	0	2
13/11/2023	0	0	0	0	0	0	0	0	0	3.4	0	0	0	0	0	0	0	0	0	0	0	0	2
Sum	11.0	6.4	5.2	0.0	0.0	0.0	8.4	0.0	0.7	3.4	0.0	10.2	11.0	5.5	39.1	28.0	57.0		0.0	132.8	87.2	72.8	97.4

Mekong River Commission Secretariat

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