



Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin 18 – 24 June 2024

Prepared by
The Regional Flood and Drought Management Centre
25 June 2024

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Key Messages

Key messages for this weekly report are presented below.

Rainfall monitoring and forecast

- In the period of 18 - 24 June 2024, there has been light to heavy rainfall has been observed over the LMB. Especially, during 23 – 24 June, heavy and very heavy rainfall has been observed over the LMB in Luang Prabang, Paksane, Muang Kao, Nakhon Phanom, and Khong Chiam.
- During 25 June – 01 July 2024, the accumulated rainfall over the entire Lower Mekong Basin is distributed with light to heavy rain. However, from 26 - 27 June, moderate rainfall is expected to occur over the Lower Mekong Basin, and heavy rain may potentially occur in the central part of Laos, the upper part of the 3S Basin, and the southwestern and central part of Cambodia on 26 June.

Water level monitoring and forecast

- At 22 key monitoring stations along the Mekong mainstream from 18 – 24 June 2024, water levels are normal, and the flow threshold (PMFM 6C) are under normal conditions. It is also the same condition for Tan Chau and Chau Doc monitoring stations, which are significantly influenced by sea tidal fluctuation.
- In the period of 25 – 29 June 2024, Water levels are forecasted to be slightly decreasing and stable at upper stretches of LMB including Chiang Saen, and Luang Prabang. However, water level at other remaining stations from Chiang Khan to Pakse will either rise or be stable, while other downstream stations will slightly rise. At Tan Chau and Chau Doc stations, the water levels are predicted to be also fluctuated, resulting from the influence of sea tidal patterns. Water levels at most of the stations are expected to be below their long-term averages (LTAs) except for Luang Prabang station.

Drought condition and forecast

- During 18-24 June 2024, the LMB was at moderate drought in some areas of the middle and lower parts. Drought specifically covered some areas of Battambang, Pursat, Khammuan, Savannakhet, Surin, Buri Ram, Nakhon Ratchasima, Gia Lai, Dak Nong, and Dak Lak. Severe drought was found in Savannakhet.
- The next three-month forecast of rainfall indicates that north-eastern Cambodia, middle and southern Laos and eastern Thailand are likely receiving below average rainfall in June and July, while Cambodia is forecasted to be the wettest area which is likely receiving above average rainfall in June and July. The forecast also indicates that the LMB might receive less than average rain specifically in the middle and south-eastern regions and southern Laos is likely the driest area in the region.

1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydrological situation in the Lower Mekong River Basin (LMB) for **18 – 24 June 2024**. 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. The 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 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.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

During the last week, the Lower Mekong Basin influenced by the low-pressure cell and the moderate southwest monsoon. The light to heavy rainfall has been only observed over this region.

Figure 1 presents mean sea level pressure over the region. It is forecasted that the moderate southwest monsoon and the low-pressure will be influenced to the Lower Mekong Basin from 25 June to 01 July. Therefore, in the upcoming seven days, the Lower Mekong Basin is expected to experience light to heavy rainfall, especially heavy rain may potentially occur in the upper and central part of Laos, the upper part of the 3S Basin, and the southwestern and central part of Cambodia.

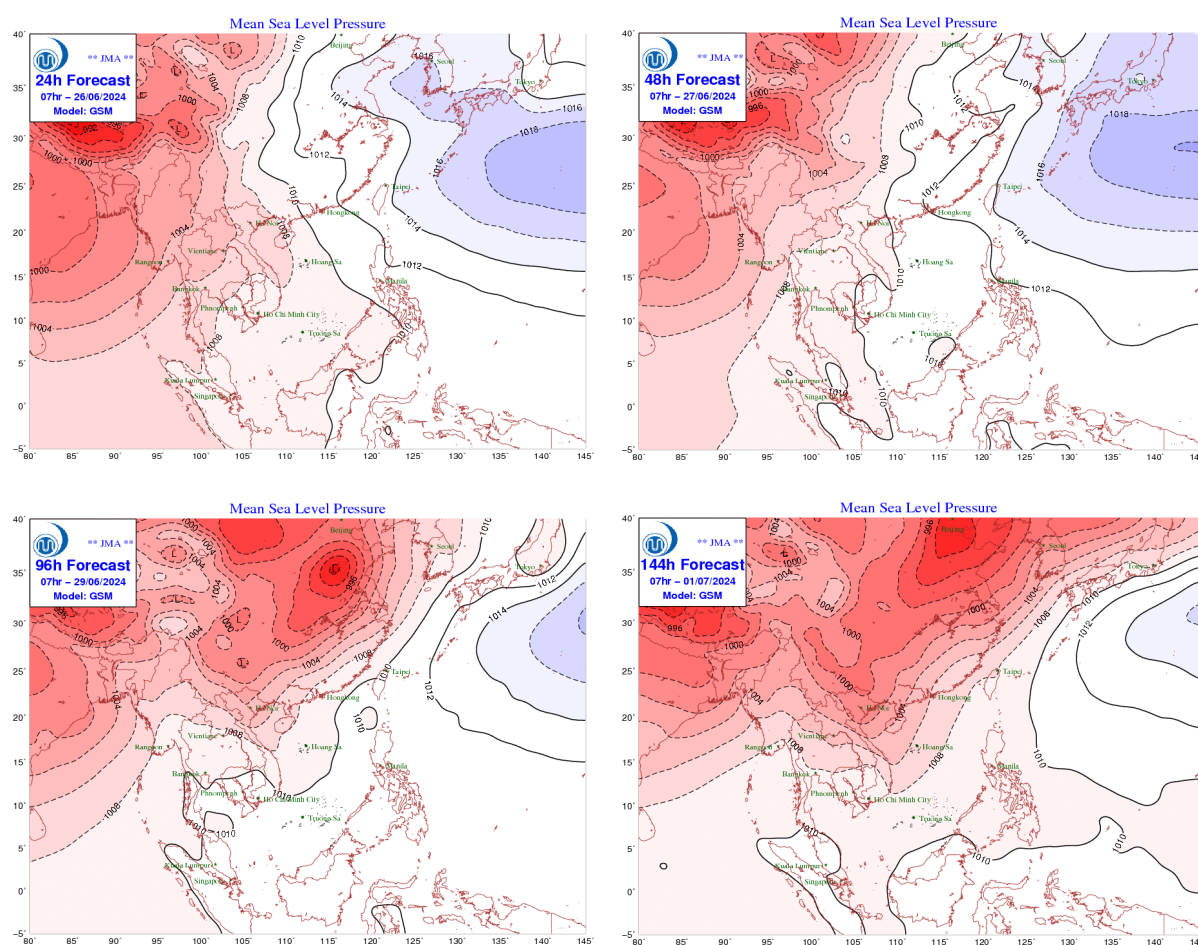


Figure 1: Weather conditions over the LMB

According to the ASEAN Specialised Meteorological Centre (ASMC, <http://asmc.asean.org/home/>), the subseasonal weather outlook (24 June – 07 July 2024) indicates that entire Lower Mekong Basin (LMB) is likely in in wetter condition and there is no warmer conditions in the LMB during abovementioned period. **Figure 2** shows the outlook of weather condition from 24 June – 07 July 2024 in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

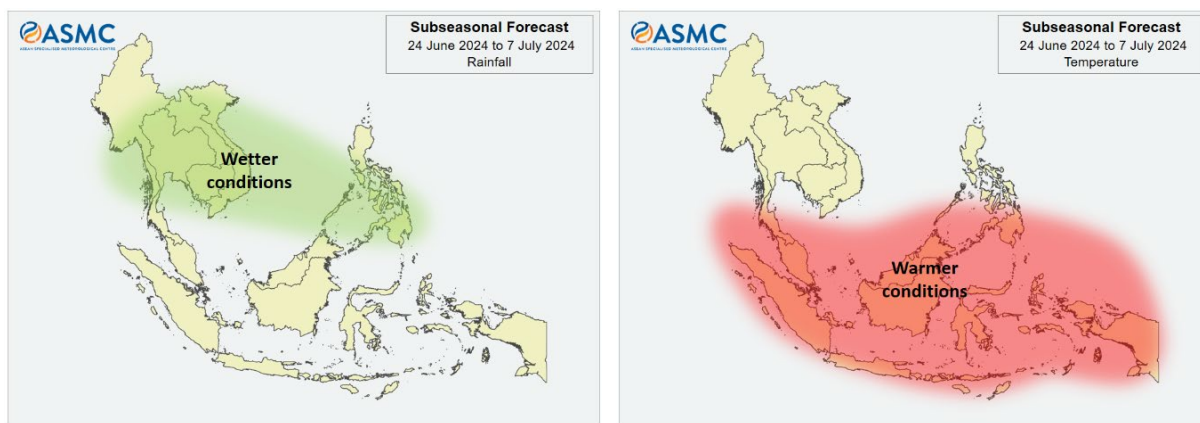


Figure 2: Outlook of wet and dry conditions over the Asian countries by ASMC.

Based on the tropical storm risk (TS) (<https://www.tropicalstormrisk.com/>), there is no active NW pacific system as of 24 June 2024 as displayed in **Figure 3**.

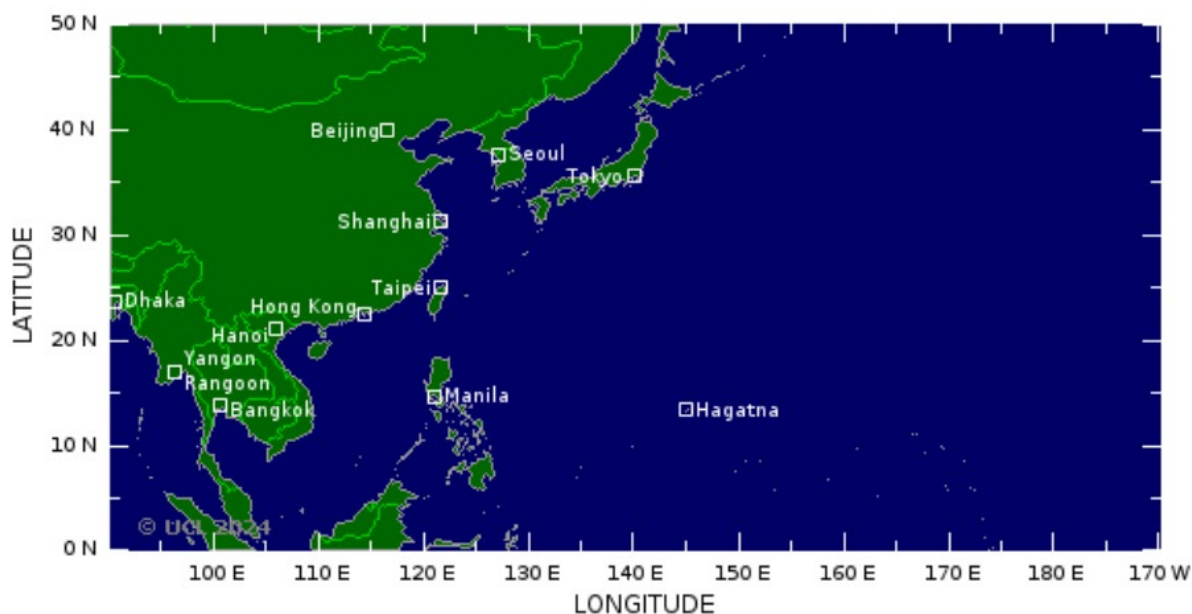


Figure 3: One tropical storm risk observed on 24 June 2024

3. Rainfall and Water Level Monitoring

3.1. Rainfall monitoring

The weekly accumulated rainfall is based on the observed data provided by the MRC Member Countries – Cambodia, Lao PDR, Thailand, and Viet Nam – from 18 - 24 June 2024 (**Figure 4**). The light to heavy rainfall has been only observed over the LMB. Heavy and very heavy rainfall has been observed in Luang Prabang, Paksane, Muang Kao, Nakhon Phanom, and Khong Chiam.

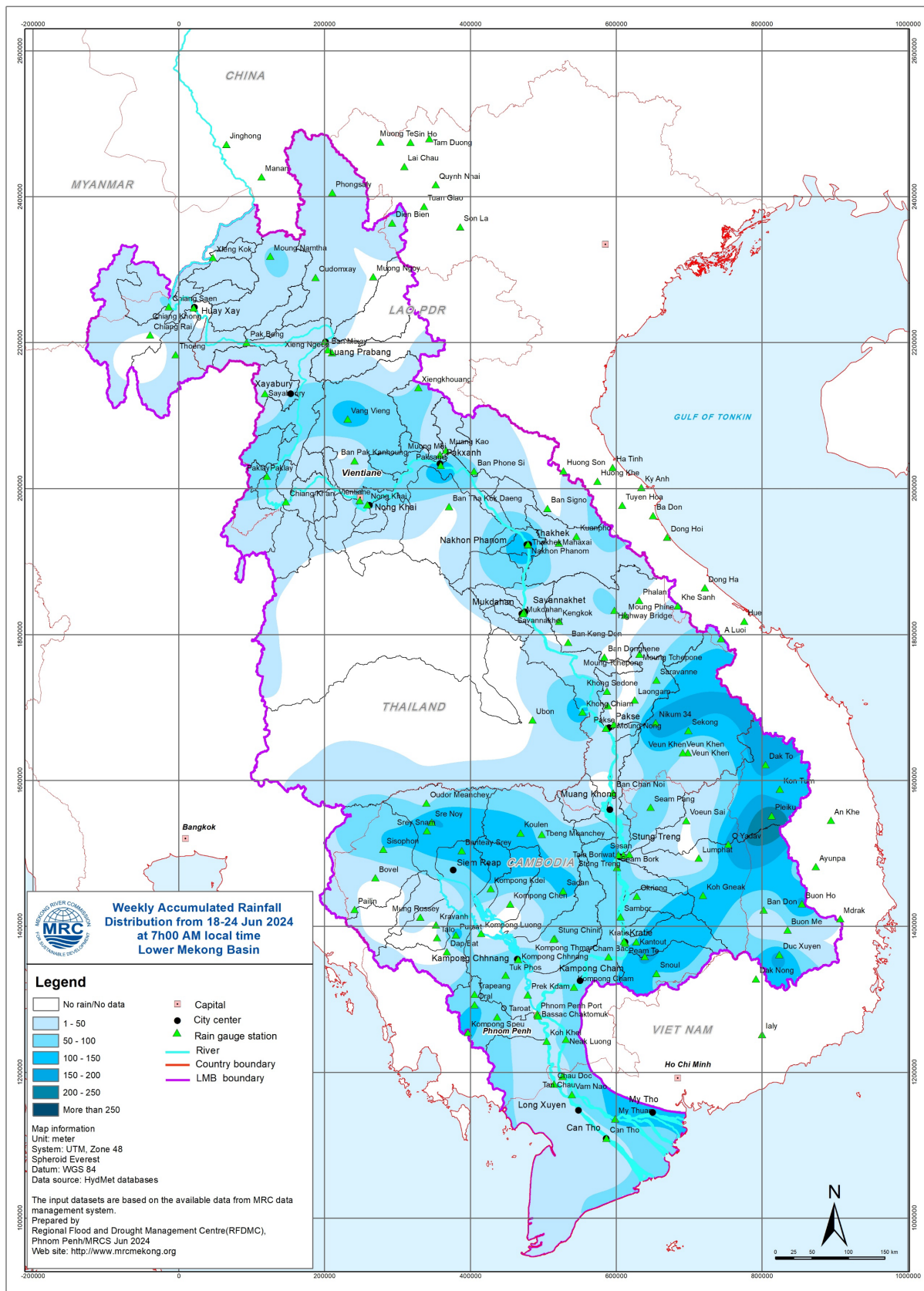


Figure 4: Weekly rainfall distribution over the LMB during 18 – 24 June 2024

3.2. Water level monitoring

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 5**. The hydrograph for each key station is available from the MRC's River Flood Forecasting: <http://ffw.mrcmekong.org/overview.php>.

During 18 – 24 June 2024, the observed water level (WL) at Jinghong hydrological station¹, was almost constant and ranges between 536.71 m and 537.43 m, which are corresponding to the outflow between 1,910.00 m³/s to 2,520.00 m³/s (recorded on 7:00 am), respectively (**Figure 6**). The water level in Chiang Saen station also indicated a slight fluctuation ranging from 2.91 m to 3.47 m. At the same period, the water level in Luang Prabang station also slightly decreased with an approximate value of -0.06 m from 9.52 m to 9.46 m as compared to the previous week. Moreover, at Chiang Khan station, water level has also increased from 6.31 m to 6.48 m.

During the same period, the water levels observed at Vientiane, Nongkhai, Nakhon Phanom, Thakhek, Mukdahan, Savannakhet, Khong Chiam, and Pakse have been slightly decreasing from 3.86 m to 3.57 m, 3.63 m to 3.3 m, 3.69 m to 3.12 m, 4.87 m to 4.37 m, 3.74 m to 3.27 m, 2.1 m to 1.72 m, 3.98 m to 3.64 m, and 2.76 m to 2.64 m, respectively. However, water levels at Paksane, Stung Treng and Kratie have been increasing from 3.84 m to 4.0 m, 3.52 m to 3.97 m, and 8.95 m to 9.59 m, respectively from the previous week.

Moving down to the floodplain area at Kampong Cham, Phnom Penh (Bassac), Phnom Penh Port, Koh Khel, and Prek Kdam the water levels have increased from 3.44 m to 3.96 m, 1.95 m to 2.2 m, 0.95 m to 1.12 m, 1.96 m to 2.24 m and 1.08 m to 1.34 m, respectively from previous week. However, at Neak Luong, the water level has slightly increased from 1.54 m to 1.42 m.

Similar to the previous week, the water levels from 18 to 24 June 2024 at Viet Nam's Tan Chau and Chau Doc fluctuated between their LTA values due to daily tidal effects from the sea. At the Tan Chau station, the water levels varied between 0.27 m and 0.05 m, while at the Chau Doc station, they ranged from 0.43 m to 0.21 m.

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>.

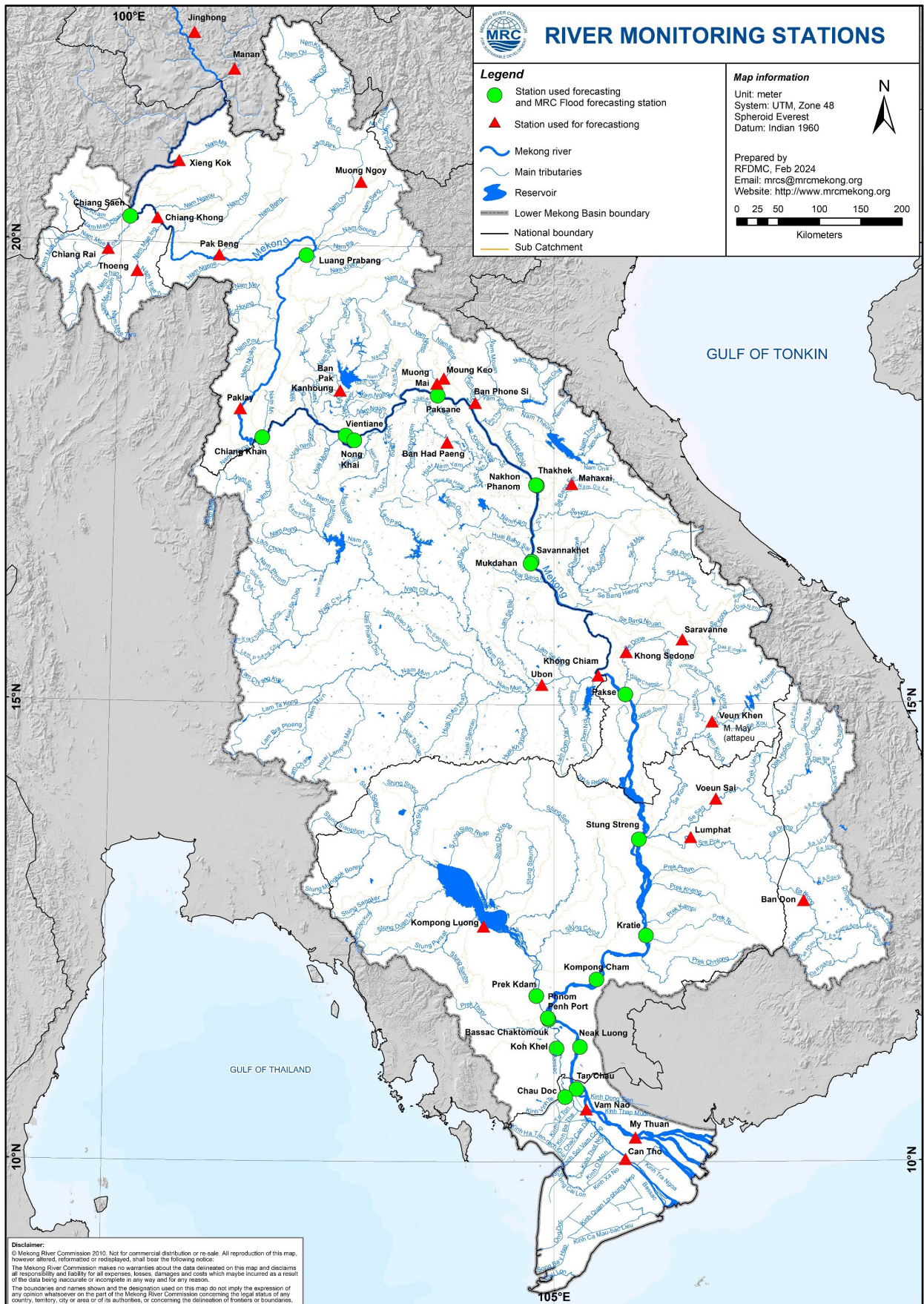


Figure 5: The key stations along LMB for river flood forecasting

The water levels in key monitoring stations on 24 June 2024 are below their long-term averages (LTAs) except for the Luang Prabang station. Moreover, all stations with available PMFM (Article 6C) thresholds are in normal conditions. The graphics of water level monitoring in all key stations are presented in **Annex A** and the weekly water levels and rainfall at each key station are summarised in **Annex B**.

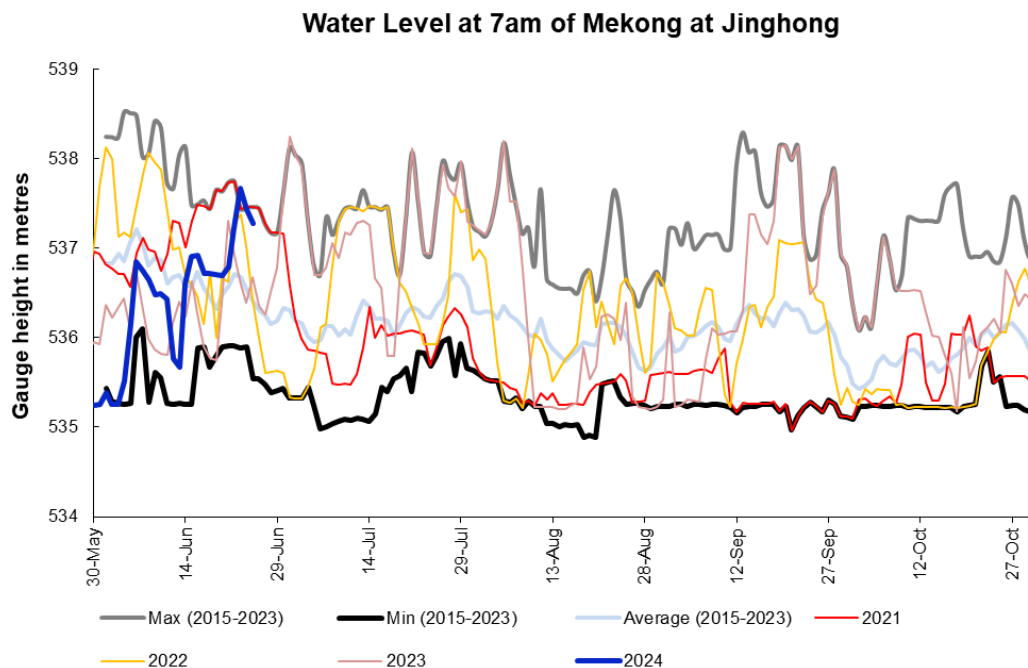


Figure 6. Water level at the Jinghong hydrological station up to 24 June 2024.

At the end of the wet season, when water levels along the Mekong River subside, the outflow of the Tonle Sap Lake (TSL) returns 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 monitoring station, the outflow of the Tonle Sap Lake took place since 28 September 2023.

The outflow flow is calculated based on a formula of rating-curves using by difference of water levels at Kompong Luong and Phnom Penh Port stations for slop and Prek Kdam as cross-section of the Lake. The formula of flow is as follows:

$$Flow = WL_{Prek\ Kdam}^{1.2} \times \sqrt{|WL_{Phnom\ Penh\ Port} - WL_{Kompong\ Luong}|}$$

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

The seasonal changes of the inflow/reverse flow and the outflow of the TSL at Prek Kdam in comparison with the flows of 2020, 2021 and 2022, 2023 and their LTA level (1997-2023) are illustrated in **Figure 8**. Up to 24 June 2024, it was observed that the main outflow to Tonle Sap Lake decreased due to limited rainfall and less inflows from upstream (**Figure 8**). This decreased outflow of Tonle Sap Lake was most likely caused by low inflows from its tributaries.

The seasonal changes in monthly flow volumes up to 24 June 2024 for the TSL compared with that in 2020, 2021, 2022, 2023 and their LTAs, and the fluctuation levels (1997–2023) are presented in **Table 8**. The mean monthly water volume of the Tonle Sap Lake in May 2024 is lower than its LTA (about 87.34 %), 2023 and 2022 but higher than that in 2019, 2020, and 2021 during the same period (**Figure 8** and **Table 1**).

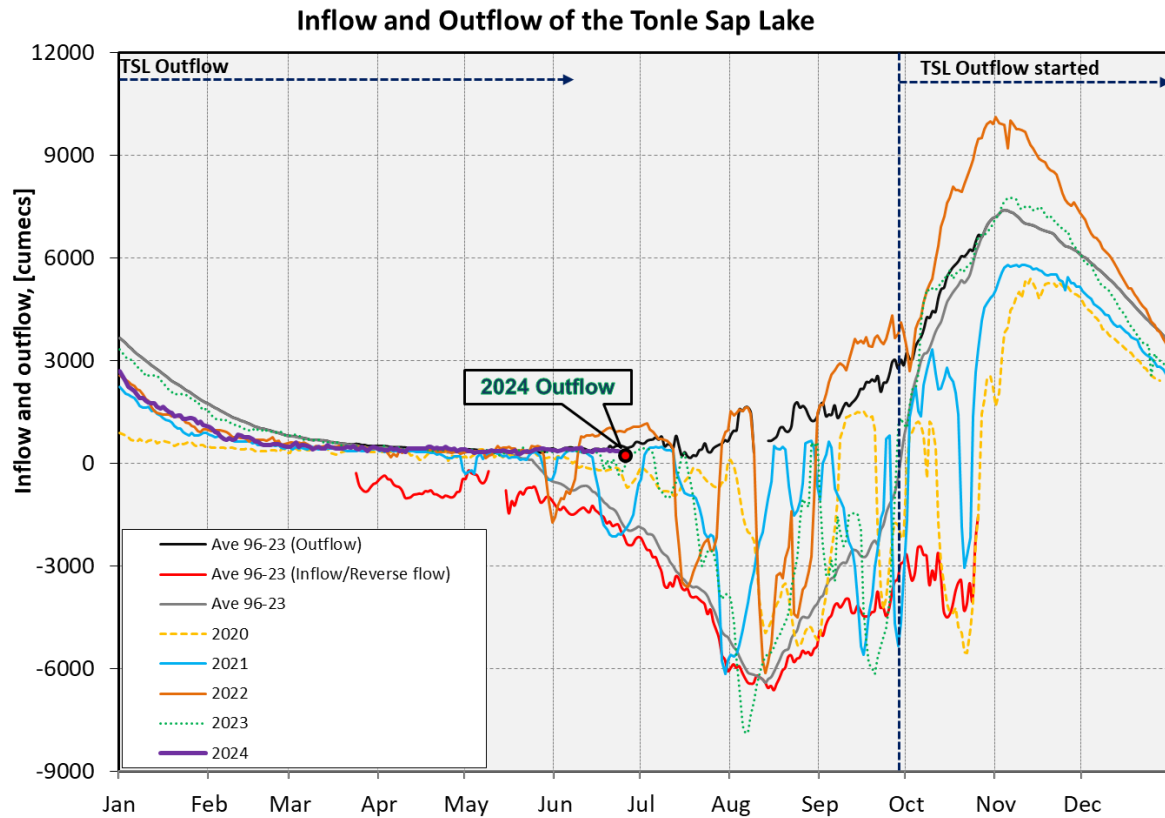


Figure 7: Seasonal change of inflows and outflows of Tonle Sap Lake.

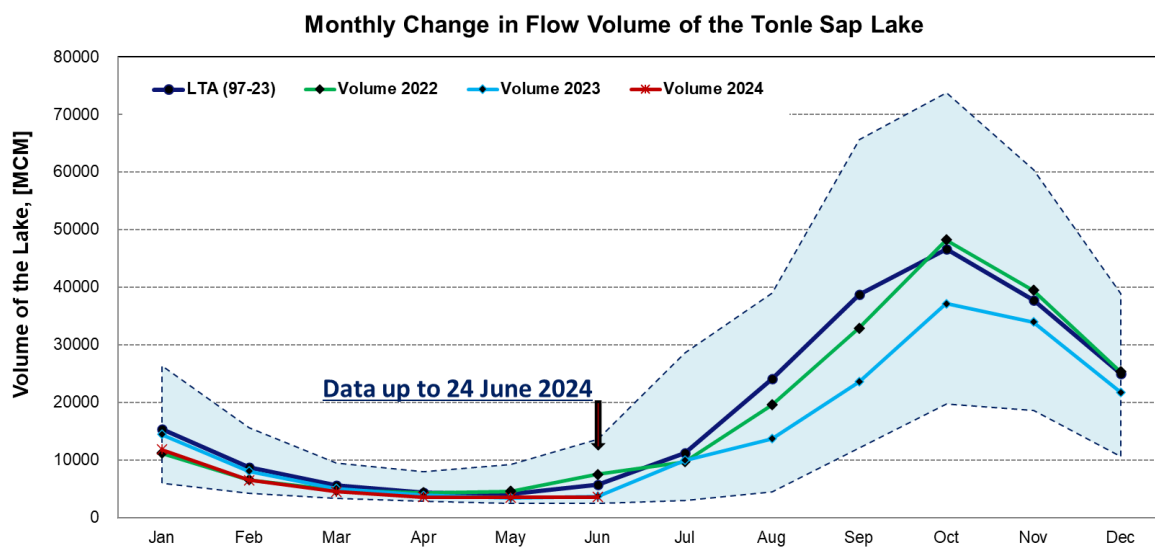


Figure 8. The seasonal change in monthly flow volume of Tonle Sap Lake.

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 2024 [MCM]	Volume in 2024 [%], compared with its LTA
Jan	15322.86	26357.53	5906.80	10285.31	5906.80	9923.80	11214.32	14422.11	11824.86	77.17
Feb	8723.39	15596.22	4198.60	6019.30	4264.19	5832.97	6558.79	8069.29	6505.88	74.58
Mar	5602.68	9438.24	3347.07	4354.62	3553.99	4264.88	4736.52	5080.64	4488.23	80.11
Apr	4327.36	8009.14	2866.91	3667.47	2992.61	3556.68	4288.31	3884.16	3569.01	82.48
May	4027.82	9176.93	2417.81	3266.43	2594.92	3240.78	4556.83	3438.66	3517.79	87.34
Jun	5699.50	13635.01	2468.70	3517.06	2641.88	3798.29	7489.04	3689.97	3569.14	62.62
Jul	11188.79	28599.56	2925.86	4001.99	2925.86	5346.73	9703.79	9953.41		
Aug	24070.98	39015.12	4433.46	7622.71	5941.07	10547.80	19554.70	13694.57		
Sep	38787.47	65632.35	12105.31	24194.19	12105.31	16382.34	32860.34	23550.60		
Oct	46562.09	73757.23	19705.50	30358.38	20799.13	27318.21	48199.12	37141.40		
Nov	37739.30	60367.33	18534.61	19112.65	27546.80	28982.93	39452.53	33929.52		
Dec	25009.52	38888.95	10563.49	10577.29	18251.65	20170.76	25346.65	21757.70		
	Critical situation: lower than long-term minimum values (LTMIN)									
	Normal condition: within the range of long-term min (LTMIN) and max (LTMAX) values									
	Low volume situation: lower than long-term average (LTA)									
Unit: Million Cubic Meter (1 MCM = 0.001 km³)										

Remarks: the volume of Tonle Sap Lake in 2024 is updated until 24 June 2024.

4. Flash Flood in the Lower Mekong Basin

During the weekly monitoring period from 18 – 24 June, the LMB received light to heavy rain and thunderstorms in some areas.

According to the Southeast Asian Flash Flood Guidance System (SEAFFGS) and analysis, flash flood guidance was detected high level in the next 1, 3 and 6 hours in some areas of Lao PDR, Cambodia, and Viet Nam on 23 - 24 June the reporting period as shown in [Figure 14](#) and [Table 2](#).

FLASH FLOOD GUIDANCE IN THE LOWER MEKONG BASIN								
In the next 01 hour			In the next 03 hour			In the next 06 hour		
Province	District	Level of FFG	Province	District	Level of FFG	Province	District	Level of FFG
Mondul Kiri	Kaoh Nheak	high	Kratie	Snuol	low	Kratie	Snuol	moderate
Mondul Kiri	Pechr Chenda	low	Kratie	Preaek Prasab	low	Kratie	Chhloung	moderate
Mondul Kiri	Kaev Seima	high	Kratie	Chhloung	high	Mondul Kiri	Kaoh Nheak	moderate
Mondul Kiri	Ou Reang	low	Mondul Kiri	Kaoh Nheak	low	Mondul Kiri	Pechr Chenda	moderate
Mondul Kiri	Kaev Seima	low	Mondul Kiri	Pechr Chenda	low	Mondul Kiri	Kaev Seima	moderate
Preah Vihear	Choam Khsant	low	Mondul Kiri	Kaev Seima	low	Ratana Kiri	Ou Chum	moderate
Ratana Kiri	Ta Veaeng	high	Ratana Kiri	Ta Veaeng	low	Ratana Kiri	Koun Mom	moderate
Ratana Kiri	Andoung Meas	low	Ratana Kiri	Andoung Meas	low	Ratana Kiri	Koun Mom	moderate
Ratana Kiri	Ou Chum	low	Ratana Kiri	Ou Chum	low	Ratana Kiri	Lumphat	high

FLASH FLOOD GUIDANCE IN THE LOWER MEKONG BASIN								
In the next 01 hour			In the next 03 hour			In the next 06 hour		
Province	District	Level of FFG	Province	District	Level of FFG	Province	District	Level of FFG
Ratana Kiri	Koun Mom	moderate	Ratana Kiri	Koun Mom	low	Ratana Kiri	Ou Ya Dav	high
Ratana Kiri	Bar Kaev	moderate	Ratana Kiri	Bar Kaev	low	Ratana Kiri	Veun Sai	low
Ratana Kiri	Koun Mom	moderate	Ratana Kiri	Koun Mom	low	Ratana Kiri	Ta Veaeng	high
Ratana Kiri	Lumphat	high	Ratana Kiri	Lumphat	high	Stung Treng	Siem Pang	high
Ratana Kiri	Ou Ya Dav	high	Ratana Kiri	Ou Ya Dav	high	Stung Treng	Sesan	high
Ratana Kiri	Veun Sai	high	Ratana Kiri	Veun Sai				
Stung Treng	Siem Pang	high	Stung Treng	Siem Pang				
Stung Treng	Thala Barivat	low	Stung Treng	Thala Barivat				
Stung Treng	Sesan	low	Stung Treng	Sesan				
Kratie	Snuol	low						
Kratie	Preaek Prasab	low						
Kratie	Chhloung	high						

FLASH FLOOD GUIDANCE IN THE LOWER MEKONG BASIN								
In the next 01 hour			In the next 03 hour			In the next 06 hour		
Province	District	Level of FFG	Province	District	Level of FFG	Province	District	Level of FFG
Attapeu	Sanxay	high	Attapeu	Xaysetha	moderate	Attapeu	Sanxay	moderate
Attapeu	Sanamxay	moderate	Attapeu	Sanxay	moderate	Champasak	Moonlapam	moderate
Attapeu	Samakkhix	moderate	Attapeu	Sanamxay	moderate	Xaysomboun	Longxan	moderate
Attapeu	Xaysetha	moderate	Champasak	Paksong	moderate	Vientiane	Thoulakho	moderate
Attapeu	Phouvong	moderate	Champasak	Moonlapam	moderate	Vientiane	Xanakham	high
Champasak	Paksong	moderate	Khammuane	Nakai	moderate			
Champasak	Pathoomph	moderate	Khammuane	Bualapha	moderate			
Champasak	Moonlapam	moderate	Sekong	Lamarm	moderate			
Khammuane	Nakai	moderate	Vientiane	Thoulakho	moderate			
Khammuane	Bualapha	moderate	Vientiane	Xanakham	high			
Khammuane	Bualapha	moderate	Xaysomboun	Longxan				
Sekong	Lamarm	moderate						
Vientiane	Phonhong	moderate						
Vientiane	Thoulakho	moderate						
Vientiane	Sangthong	moderate						
Vientiane	Xanakham	high						
Xayaboury	Paklai	moderate						
Xayaboury	Paklai	moderate						
Xaysomboun	Longxan	moderate						

FLASH FLOOD GUIDANCE IN THE LOWER MEKONG BASIN								
In the next 01 hour			In the next 03 hour			In the next 03 hour		
Province	District	Level of FFG	Province	District	Level of FFG	Province	District	Level of FFG
Kon Tum	Dak To	high	Kon Tum	Dak To	moderate	Kon Tum	Dak To	high
Kon Tum	Sa Thay	high	Kon Tum	Sa Thay	high	Kon Tum	Sa Thay	high
Kon Tum	Dak To	moderate	Gia Lai	Chu Pah	moderate	Gia Lai	Chu Pah	moderate
Kon Tum	Kon Plong	moderate	Gia Lai	Ia Grai	moderate	Gia Lai	Ia Grai	moderate
Kon Tum	Ngoc Hoi	moderate	Gia Lai	Duc Co	high	Gia Lai	Duc Co	high
Kon Tum	TX. Kon Tum	moderate	Gia Lai	Chu Prong	moderate	Gia Lai	Chu Prong	high
Gia Lai	Duc Co	high	Dak Lak	Krong A Na	moderate	Dak Lak	Krong A Na	moderate
Gia Lai	Chu Prong	moderate						
Gia Lai	Mang Yang	moderate						
Gia Lai	Chu Pah	moderate						
Gia Lai	Chu Prong	moderate						
Gia Lai	TX. Pleiku	moderate						
Gia Lai	Ia Grai	high						
Dak Lak	Buon Don	moderate						
Dak Lak	Cu M'Gar	moderate						
Dak Lak	Krong A Na	high						
Dak Lak	Dak Mil	moderate						
Dak Lak	M'Drak	moderate						
Dak Lak	Krong A Na	moderate						

Table 2. Detected low-risk flash flood in the LMB on 23 - 24 June

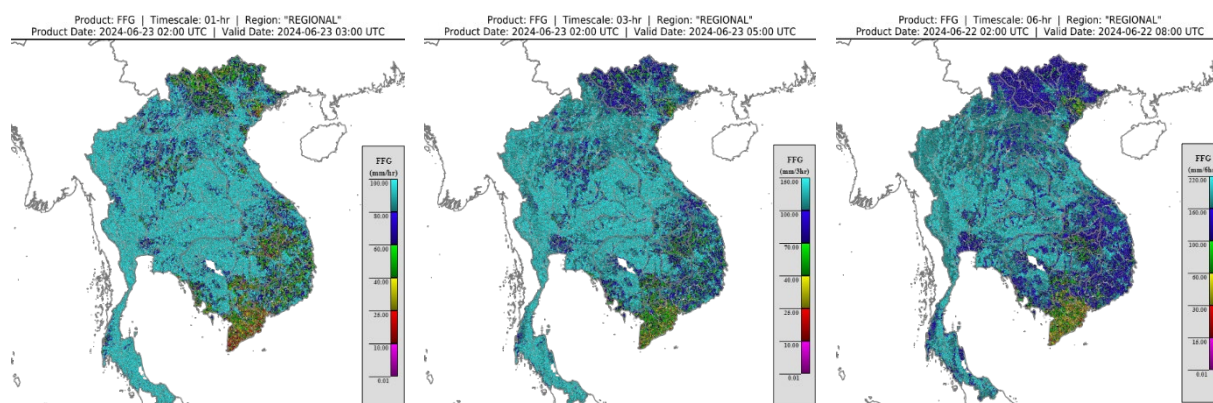


Figure 9. Flash Flood Guidance for the next 1-hr, 3-hr, and 6-hr on 24 June

5. Drought Monitoring in the Lower Mekong Basin

5.2. Weekly drought monitoring from 18 to 24 June 2024

Drought monitoring data for 2024 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)**

As indicated in **Figure 10** below, during 18-24 June, the LMB was facing some moderate and severe meteorological droughts from the north to the south over small area. Severe drought took place in Kandal, Phongsaly, Savannakhet, Chiang Rai, Nakhon Ratchasima, Buri Ram, Kalasin, Mukdahan, and Dak Nong.

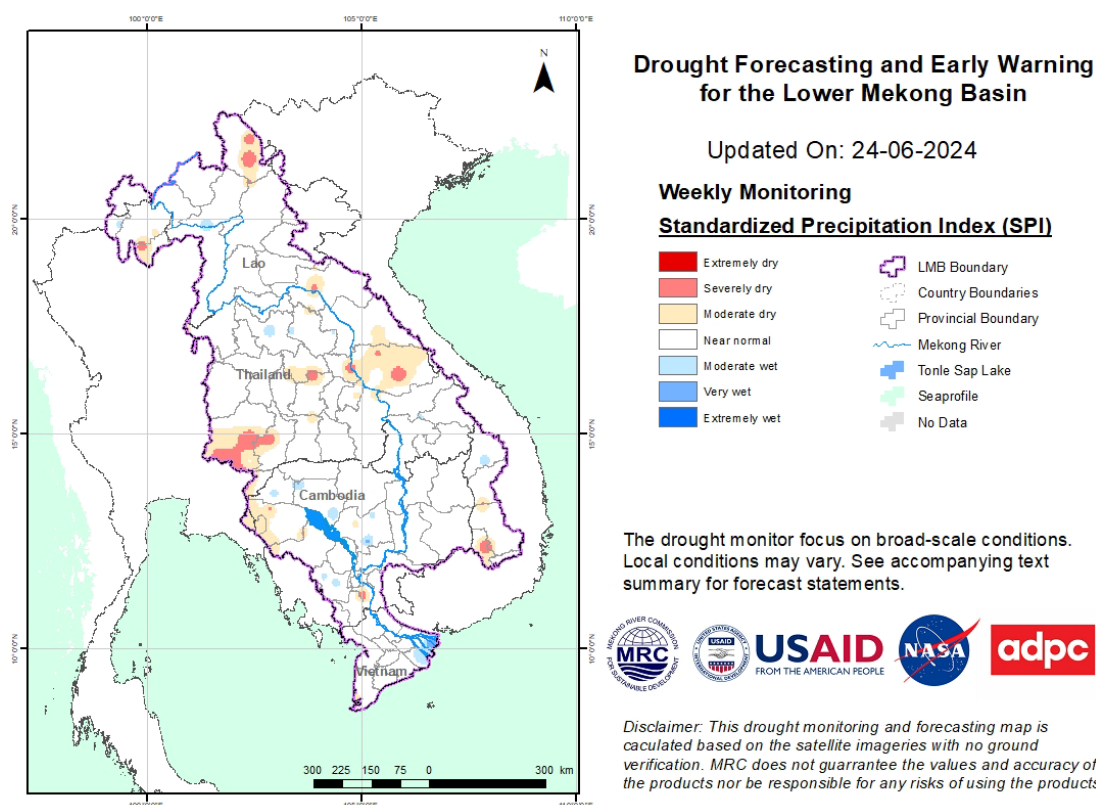


Figure 10: Weekly standardized precipitation index from June 18 to 24.

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

Some moderate and severe agricultural droughts, as displayed in **Figure 10**, were taking place in Battambang and Mondulkiri of Cambodia, Nakhon Ratchasima and Buri Ram of Thailand, Savannakhet of Lao PDR, and Gia Lai and Dak Lak of Viet Nam. Other areas were normal or wet during the monitoring week from 18 to 24 June.

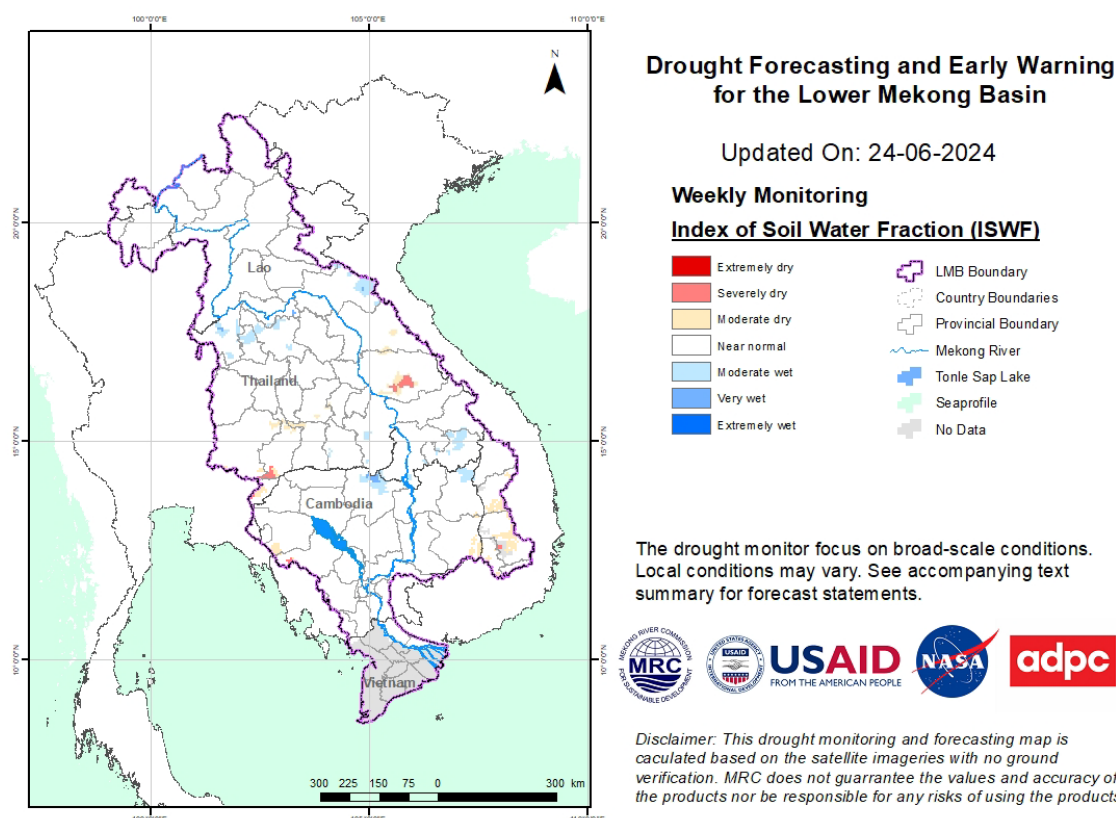


Figure 11: Weekly Index of Soil Water Fraction from June 18 to 24.

- Weekly Combined Drought Index (CDI)**

The combined drought indicator, **Figure 11**, shows that the LMB was at moderate drought in some areas of the middle and lower parts. Drought specifically covered some areas of Battambang, Pursat, Khammuan, Savannakhet, Surin, Buri Ram, Nakhon Ratchasima, Gia Lai, Dak Nong, and Dak Lak. Severe drought was found in Savannakhet.

The impacted areas are listed below:

No.	Country	Province	Moderate	Severe	Extreme	Exceptional	No.	Country	Province	Moderate	Severe	Extreme	Exceptional	No.	Country	Province	Moderate	Severe	Extreme	Exceptional
1	Cambodia	Battambang					24	Lao PDR	Oudomxai					47	Thailand	Udon Thani				
2	Cambodia	Banteay Meanchey					25	Lao PDR	Loungprabang					48	Thailand	Sakon Nakhon				
3	Cambodia	Kampong Cham					26	Lao PDR	Xayaburi					49	Thailand	Buang Kan				
4	Cambodia	Pursat					27	Lao PDR	Xiangkhouang					50	Thailand	Nakhon Phanom				
5	Cambodia	Kampong Chhnang					28	Lao PDR	Vientiane					51	Thailand	Kalasin				
6	Cambodia	Otdar Meanchey					29	Lao PDR	Vientiane Capital					52	Thailand	Mukdahan				
7	Cambodia	Preah Vihear					30	Lao PDR	Xaisomboun					53	Thailand	Roi Et				
8	Cambodia	Kampong Thom					31	Lao PDR	Borikhamxai					54	Thailand	Yasothon				
9	Cambodia	Kratie					32	Lao PDR	Khammouan					55	Thailand	Amnat Charoen				
10	Cambodia	Monduliri					33	Lao PDR	Savannakhet					56	Thailand	Ubon Ratchathani				
11	Cambodia	Ratanakiri					34	Lao PDR	Salavan					57	Thailand	Si Sa Ket				
12	Cambodia	Tbong Khmum					35	Lao PDR	Xekong					58	Thailand	Surin				
13	Cambodia	Prey Veng					36	Lao PDR	Attapu					59	Thailand	Buri Ram				
14	Cambodia	Kampot					37	Lao PDR	Champasack					60	Thailand	Nakhon Ratchasima				
15	Cambodia	Takeo					38	Thailand	Chiang Mai					61	Viet Nam	Kon Tum				
16	Cambodia	Svay Rieng					39	Thailand	Chiang Rai					62	Viet Nam	Gia Lai				
17	Cambodia	Stung Treng					40	Thailand	Payao					63	Viet Nam	Dak Nong				
18	Cambodia	Kampong Speu					41	Thailand	Loei					64	Viet Nam	Dak Lak				
19	Cambodia	Kandal					42	Thailand	Nong Bua Lam Phu					65	Viet Nam	Dong Thap				
20	Cambodia	Siem Reap					43	Thailand	Khon Kaen					66	Viet Nam	Tien Giang				
21	Lao PDR	Bokeo					44	Thailand	Nong Khai					67	Viet Nam	An Giang				
22	Lao PDR	Luangnamtha					45	Thailand	Chaiyaphum					Other provinces of the Mekong Delta of Viet Nam have no data						
23	Lao PDR	Phongsali					46	Thailand	Maha Sarakham											

Note: S: short-term drought, less than 1 months; L: long-term drought, more than 1 month

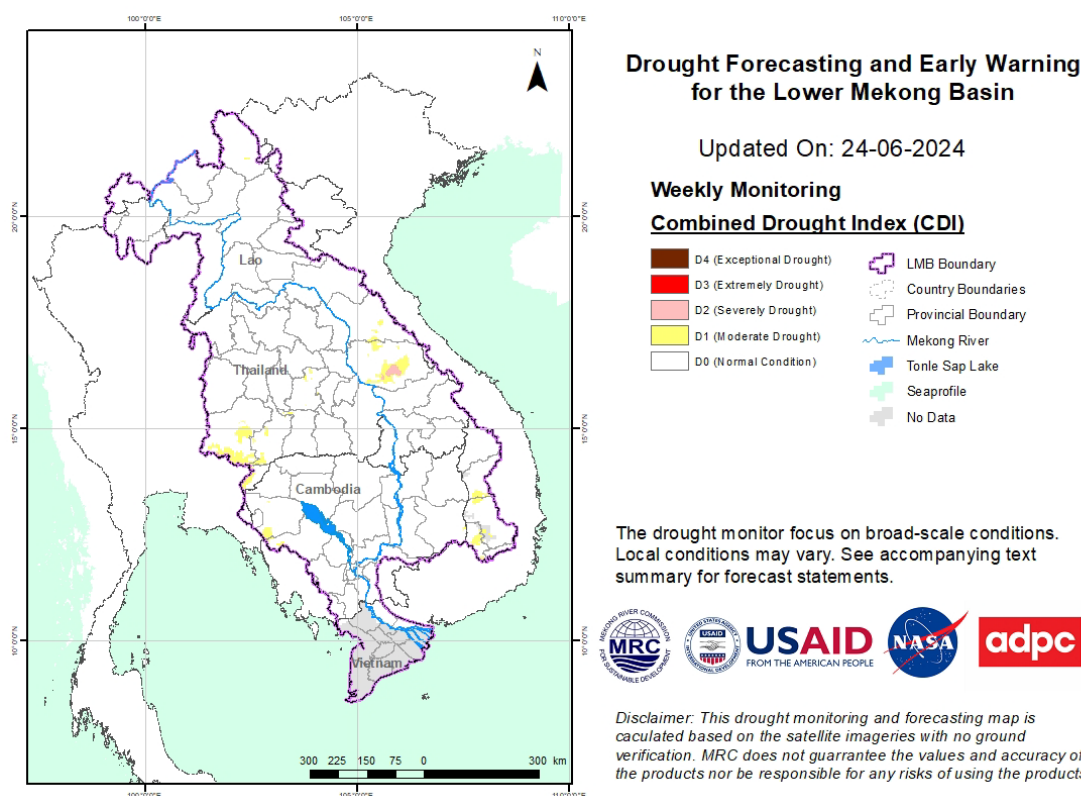


Figure 12: Weekly Combined Drought Index from June 18 to 24.

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 Rainfall forecast

From 25 June to 01 July 2024, the accumulated rainfall over the entire Lower Mekong Basin is distributed with light to heavy rain based on CHIRPS-GFS (**Figure 12**). However, from 26 - 27 June, moderate rainfall is expected to occur over the Lower Mekong Basin, and heavy rain may potentially occur in the central part of Laos, the upper part of the 3S Basin, and the southwestern and central part of Cambodia on 26 June.

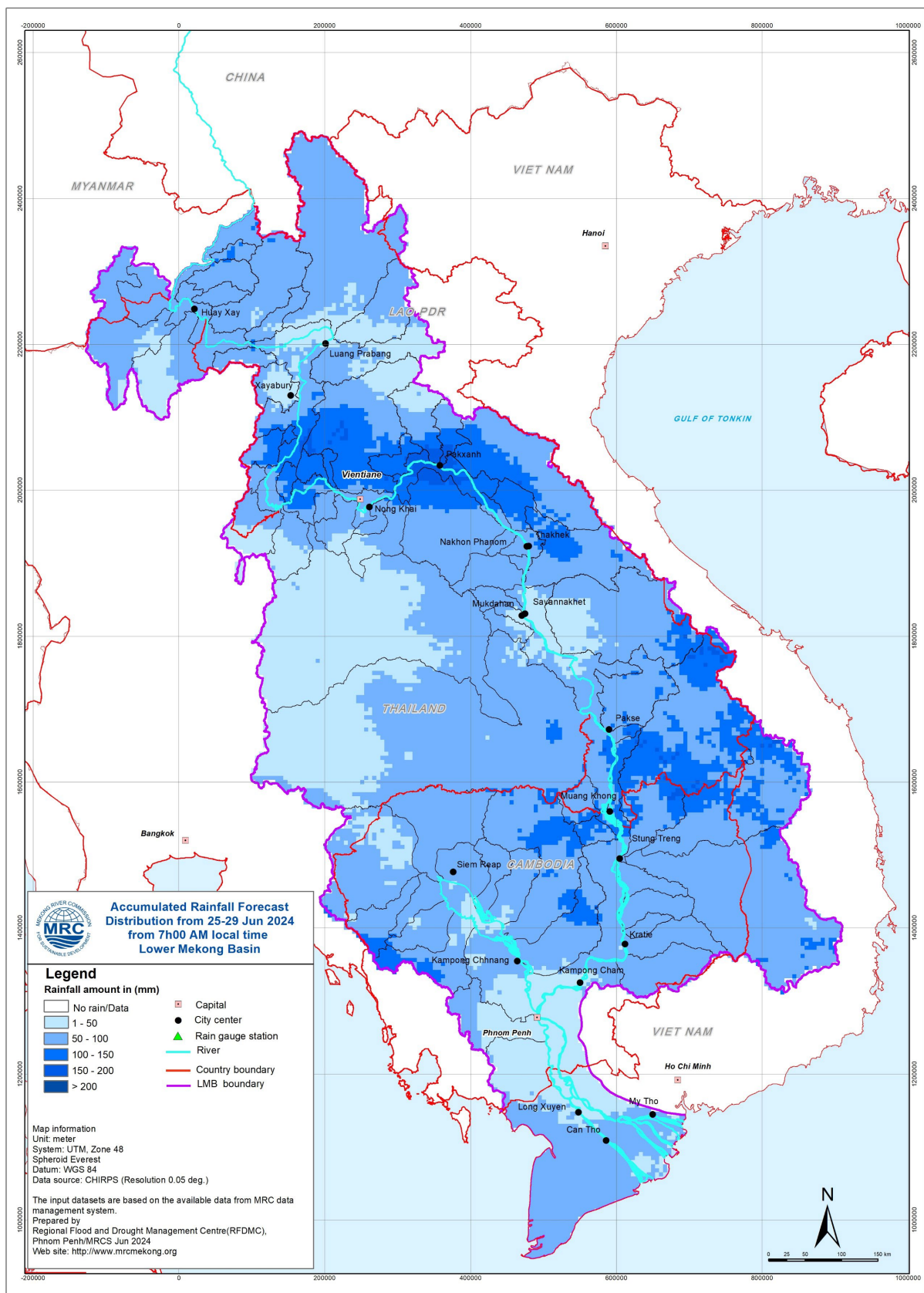


Figure 13: Accumulated rainfall forecast from CHIRP-GFS (25 – 29 June 2024)

6.2 Water level forecast

In Chiang Saen monitoring station, the water level is expected to be fluctuated over the forecasting period of 25 – 29 June 2024. However, it will slightly decrease from 3.47 m to 3.30 m. The water levels in Luang Prabang affected by backwater and Chiang Khan stations are likely stable.

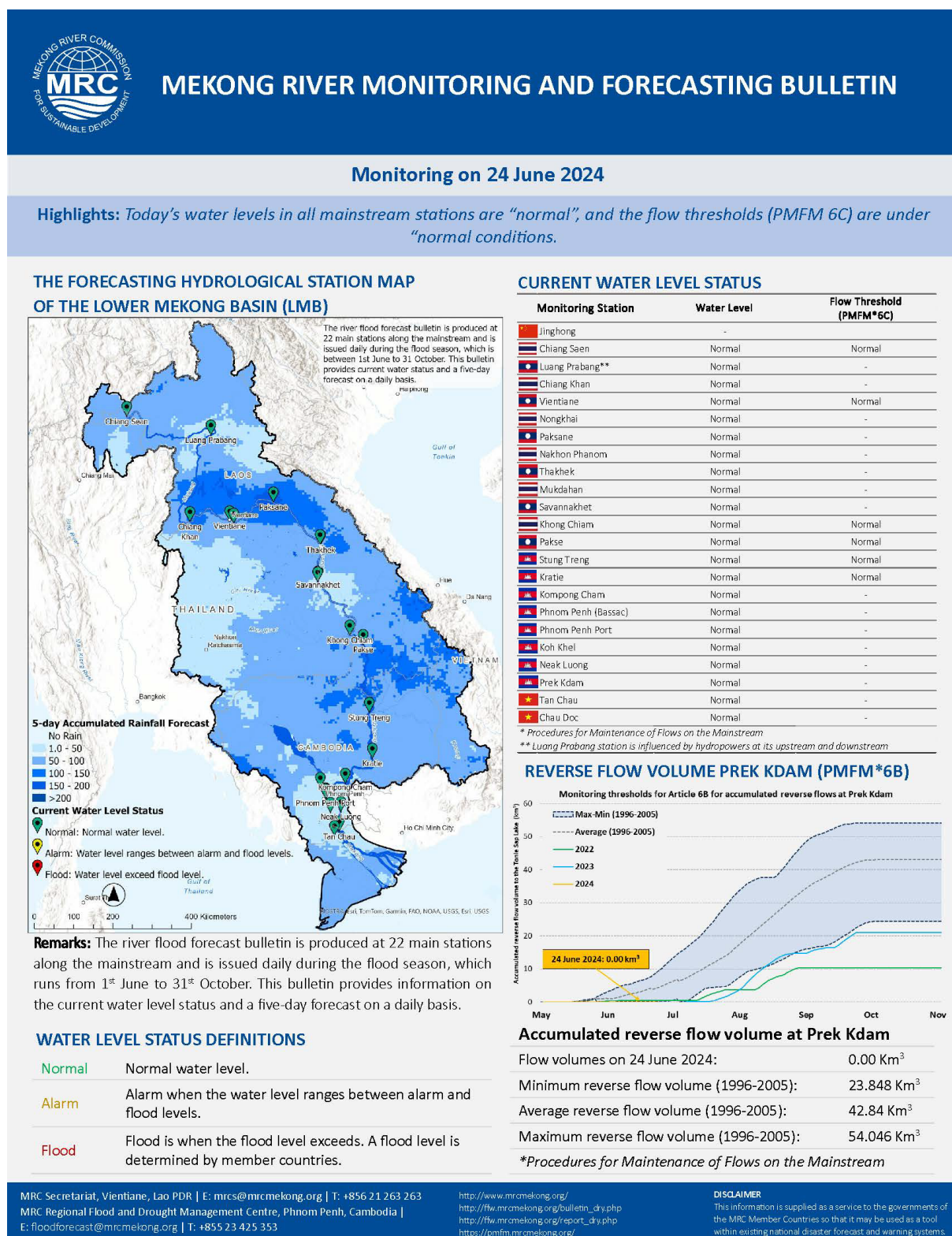
Along the Mekong mainstream, the water levels at all other upper stations from Chiang Khan to Nongkhai will slightly increase. At Chiang Khan, Vientiane, and Nongkhai water levels are expected to increase approximately 0.14 m, 0.32 m, and 0.32 m, respectively. However, at Paksane, Nakhon Phanom, Thakhek, Mukdahan, Savannakhet, Kong Chiam, and Pakse, water are likely in a stable range with either only slight increase or decrease. All stations located in Cambodia from Stung Treng to Prek Kdam, water levels are likely increasing. At Stung Treng, Kratie, Kompong Cham, Phnom Penh (Bassac), Phnom Penh Port, water level is likely rise with approximated value of 0.15 m, 0.52 m, 0.68 m, 0.36 m, and 0.36 m, respectively. However, water level at Koh Khel is expected to be slightly decrease of approximately -0.04 m as compared to the previous week.

For the Tan Chau station on the Mekong River and Chau Doc station on the Bassac River, water levels will be fluctuating approximately ranging from 0.05 to -0.16 m and 0.21 to -0.05 m, respectively, following daily tidal effects from the sea.

The water levels at key stations are forecasted to be below their LTAs except for Luang Prabang station from 18 to 24 June 2024.
























The weekly River Monitoring Bulletin and forecasting issued on 24 June 2024 can be found in **Table 2**. Results of the weekly river monitoring and forecasting bulletin are also available at <http://ffw.mrcmekong.org/bulletin.php>

Table 3. River Monitoring and Forecasting Bulletin.



Forecasting from 25 to 29 June 2024

Highlights: In the next five days, it is forecasted that water levels at all the mainstream stations will not reach the “alarm” levels.

Forecasting Station	24 h Observed Rainfall (mm)	Zero gauge above M.S.L (m)	Observed Water Level against zero gauge (m)		Forecasted Water Level (m)					Alarm Level (m)	Flood Level (m)	Forecasted Water Levels Change in 5 days (m)	Max. Water levels change within next 5 days (m)	Mln. distance to alarm level within next 5 days (m)	Mln. distance to flood level within next 5 days (m)
	23-Jun		23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun						
 Jinghong	0.0	-	537.67	↓ 537.43	-	-	-	-	-	11.50	12.80	↓ -0.17	0.25	7.78	9.08
 Chiang Saen	4.5	357.110	3.15	↑ 3.47	↑ 3.72	→ 3.70	↓ 3.54	↓ 3.38	→ 3.30	11.50	12.80	↓ -0.17	0.25	7.78	9.08
 Luang Prabang	5.6	267.195	9.48	↓ 9.46	→ 9.47	↑ 9.71	↑ 9.85	↓ 9.67	↓ 9.48	17.50	18.00	→ 0.01	0.25	7.65	8.15
 Chiang Khan	23.1	194.118	6.45	→ 6.48	→ 6.42	→ 6.35	→ 6.27	↑ 6.46	↑ 6.62	14.50	16.00	↑ 0.14	0.14	7.88	9.38
 Vientiane	32.0	158.040	3.46	↑ 3.57	→ 3.54	→ 3.50	→ 3.52	↑ 3.74	↑ 3.89	11.50	12.50	↑ 0.32	0.32	7.61	8.61
 Nongkhai	17.0	153.648	3.18	↑ 3.30	→ 3.27	→ 3.22	→ 3.25	↑ 3.48	↑ 3.62	11.40	12.20	↑ 0.32	0.32	7.78	8.58
 Paksane	2.4	142.125	4.02	↓ 4.00	→ 3.92	→ 3.86	↓ 3.75	↑ 3.87	↑ 3.98	13.50	14.50	→ -0.02	-0.25	9.52	10.52
 Nakhon Phanom	73.1	130.961	3.01	↑ 3.12	→ 3.21	→ 3.16	↓ 3.05	→ 3.00	↑ 3.12	11.50	12.00	→ 0.00	-0.12	8.29	8.79
 Thakhek	105.0	129.629	4.22	↑ 4.37	→ 4.46	→ 4.43	↓ 4.31	→ 4.27	↑ 4.38	13.00	14.00	→ 0.01	-0.10	8.54	9.54
 Mukdahan	4.0	124.219	3.21	→ 3.27	↑ 3.43	→ 3.46	→ 3.46	→ 3.40	→ 3.36	12.00	12.50	→ 0.09	0.19	8.54	9.04
 Savannakhet	4.4	124.219	1.70	→ 1.72	↑ 1.88	→ 1.92	→ 1.91	→ 1.85	→ 1.80	12.00	13.00	→ 0.08	0.20	10.08	11.08
 Khong Chiam	53.8	89.030	3.85	↓ 3.64	↑ 3.77	→ 3.77	→ 3.73	→ 3.64	→ 3.58	13.50	14.50	→ -0.06	0.13	9.73	10.73
 Pakse	4.0	86.490	2.70	↓ 2.64	→ 2.59	→ 2.58	→ 2.55	→ 2.54	↑ 2.60	11.00	12.00	→ -0.04	-0.10	8.40	9.40
 Stung Treng	30.0	36.790	3.71	↑ 3.97	→ 4.00	→ 3.98	→ 3.98	↑ 4.03	↑ 4.12	10.70	12.00	↑ 0.15	0.15	6.58	7.88
 Kratie	0.0	-0.101	9.23	↑ 9.59	↑ 9.91	↑ 10.00	→ 10.00	→ 10.02	↑ 10.11	22.00	23.00	↑ 0.52	0.52	11.89	12.89
 Kompong Cham	2.0	-0.930	3.83	↑ 3.96	↑ 4.25	↑ 4.47	↑ 4.53	↑ 4.59	↑ 4.64	15.20	16.20	↑ 0.68	0.68	10.56	11.56
 Phnom Penh (Bassac)	0.3	-1.020	2.15	↑ 2.20	↑ 2.33	↑ 2.45	↑ 2.52	→ 2.54	→ 2.56	10.50	12.00	↑ 0.36	0.36	7.94	9.44
 Phnom Penh Port	nr	0.070	1.13	↑ 1.16	↑ 1.29	↑ 1.41	↑ 1.48	→ 1.50	→ 1.52	9.50	11.00	↑ 0.36	0.36	7.98	9.48
 Koh Khel	2.3	-1.000	2.20	↑ 2.24	↑ 2.28	↑ 2.34	↓ 2.30	↓ 2.24	↓ 2.20	7.90	8.40	↓ -0.04	0.10	5.56	6.06
 Neak Luong	8.8	-0.330	1.34	↑ 1.42	→ 1.44	↑ 1.52	↓ 1.48	↑ 1.45	→ 1.43	7.50	8.00	→ 0.01	0.10	5.98	6.48
 Prek Kdam	0.0	0.080	1.29	↑ 1.34	↑ 1.46	↑ 1.59	↑ 1.66	↑ 1.69	→ 1.71	9.50	10.00	↑ 0.37	0.37	7.79	8.29
 Tan Chau	0.6	0.000	0.26	↓ 0.05	↓ -0.30	↑ -0.33	↑ -0.30	↑ -0.20	↑ -0.16	3.50	4.50	↓ -0.21	-0.35	3.66	4.66
 Chau Doc	18.0	0.000	0.35	↓ 0.21	↓ -0.22	↑ -0.25	↑ -0.20	↑ -0.16	↑ -0.05	3.00	4.00	↓ -0.26	-0.41	3.05	4.05

WATER LEVEL FORECASTING DEFINITIONS

↑	Rising water level.
→	Stable water level: stable water level is defined as a daily change of less than 10cm from Chaing Saen to Savannakhet; less than 5cm at Pakse and Stung Treng; and no more than 3cm from Kratie downstream.
↓	Falling water level.
X	No data available.
Alarm stage	Alarm stage is when the water level ranges between alarm and flood levels.
Flood stage	Flood stage is when the flood level exceeds. A flood level is determined by member countries.

NOTES

- For **25-29 June**, moderate rainfall is expected to occur in the central parts of Lao PDR, Cambodia, the 3S Basins and southern part of the Mekong Delta. Heavy rainfall may likely occur in the southwestern Cambodia, and upper parts of the 3S basins during **27-28 June**.
- Water levels at all stations are in normal conditions, which do not reach alarm and flood levels on **24 June**. For **25-29 June**, water level at Chian Saen is expected to decrease. However, at almost other stations are expected to either increase or remain stable except for Koh Khel station. Water levels at Tan Chau and Chau Doc are forecasted to fluctuate due to tidal influence.
- Water levels at all stations are expected to be below their long-term averages (LTAs) except for Luang Prabang station from **24 to 29 June**.

6.3 Flash Flood Information

With the predicted of rainfall for the coming 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.

Further detailed information on Flash Flood Guidance Information, 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 the global scale of North America Multi-Model Ensemble (NMME) that predicts average rainfall in daily average for the next coming three months.

Figure 13 below shows the average daily rainfall forecast from June to August 2024 over the LMB area.

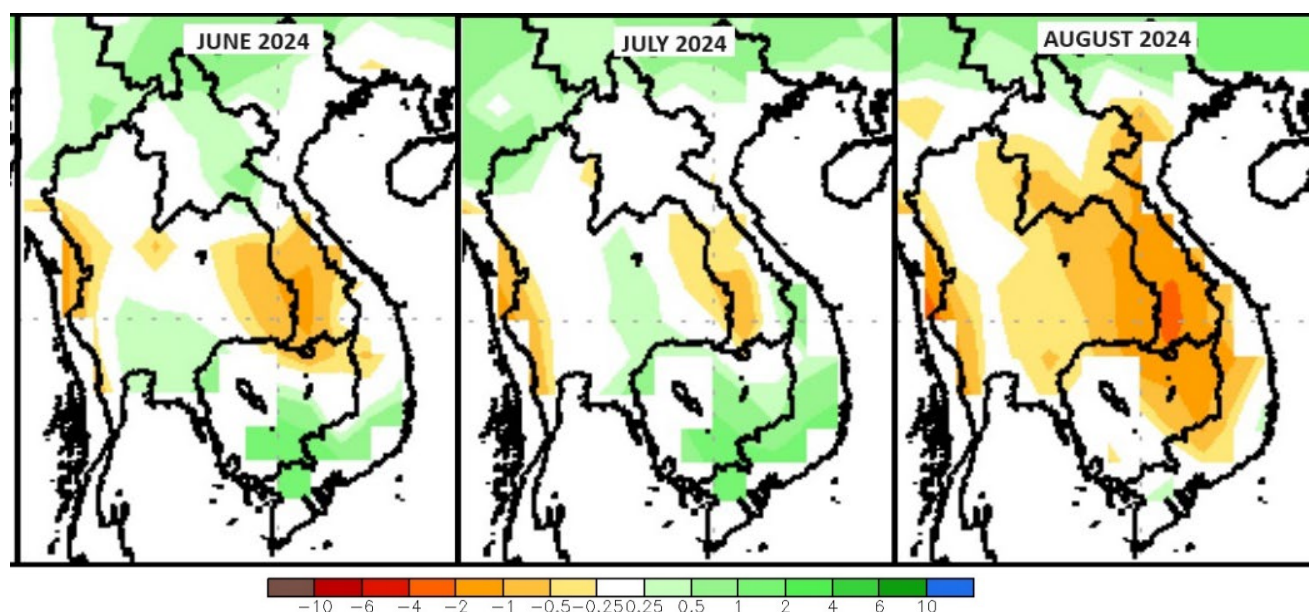


Figure 14. Monthly forecast of rainfall from NMME for June, July, and August 2024.

Figure 13 indicates that North-eastern Cambodia, middle and southern Laos and eastern Thailand are likely receiving below average rainfall in June and July, while Cambodia is forecasted to be the wettest area which is likely receiving above average rainfall in June and July. The forecast also indicates that the LMB might receive less than average rain specifically in the middle and south-eastern regions and southern Laos is likely the driest area in the region.

7 Summary and Possible Implications

7.1. Rainfall and its forecast

In the period of 18 - 24 June 2024, there has been light to heavy rainfall has been observed over the LMB. Especially, during 23 – 24 June, heavy and very heavy rainfall has been observed over the LMB in Luang Prabang, Paksane, Muang Kao, Nakhon Phanom, and Khong Chiam.

During 25 June – 01 July 2024, the accumulated rainfall over the entire Lower Mekong Basin is distributed with light to heavy rain. However, from 26 - 27 June, moderate rainfall is expected to occur over the Lower Mekong Basin, and heavy rain may potentially occur in the central part of Laos, the upper part of the 3S Basin, and the southwestern and central part of Cambodia on 26 June.

7.2. Water level and its forecast

At 22 key monitoring stations along the Mekong mainstream from 18 – 24 June 2024, water levels are normal, and the flow threshold (PMFM 6C) are under normal conditions. It is also the same condition for Tan Chau and Chau Doc monitoring stations, which are significantly influenced by sea tidal fluctuation.

In the period of 25 – 29 June 2024, Water levels are forecasted to be slightly decreasing and stable at upper stretches of LMB including Chiang Saen, and Luang Prabang. However, water level at other remaining stations from Chiang Khan to Pakse will either rise or be stable, while other downstream stations will slightly rise. At Tan Chau and Chau Doc stations, the water levels are predicted to be also fluctuated, resulting from the influence of sea tidal patterns. Water levels at most of the stations are expected to be below their long-term averages (LTAs) except for Luang Prabang station.

7.3. Flash flood and its trends

With the predicted of rainfall for the coming week as mentioned earlier in part 2, the flash flood guidance at a low to high level will likely be detected in some areas of the LMB.

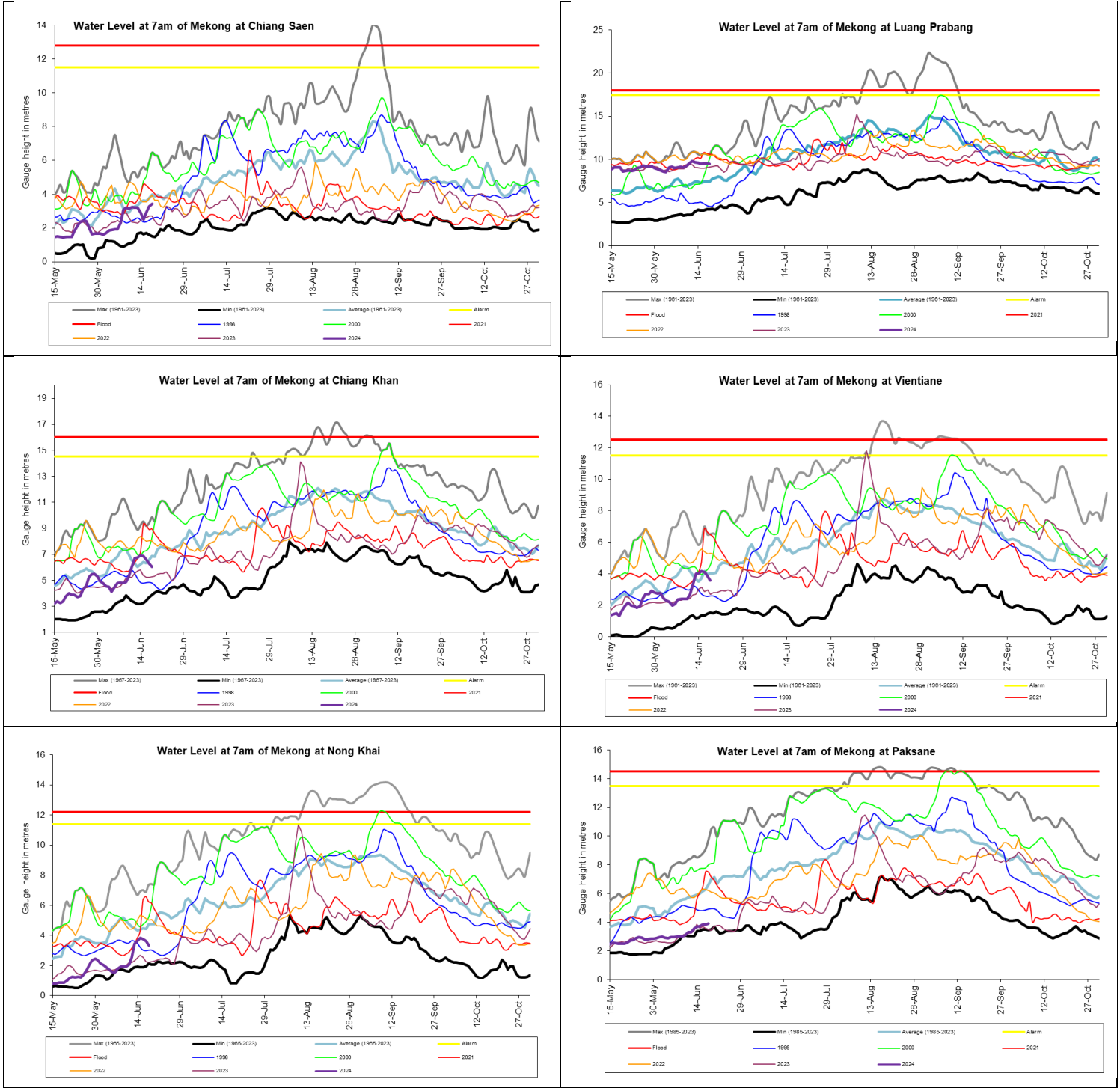
7.4. Drought condition and its forecast

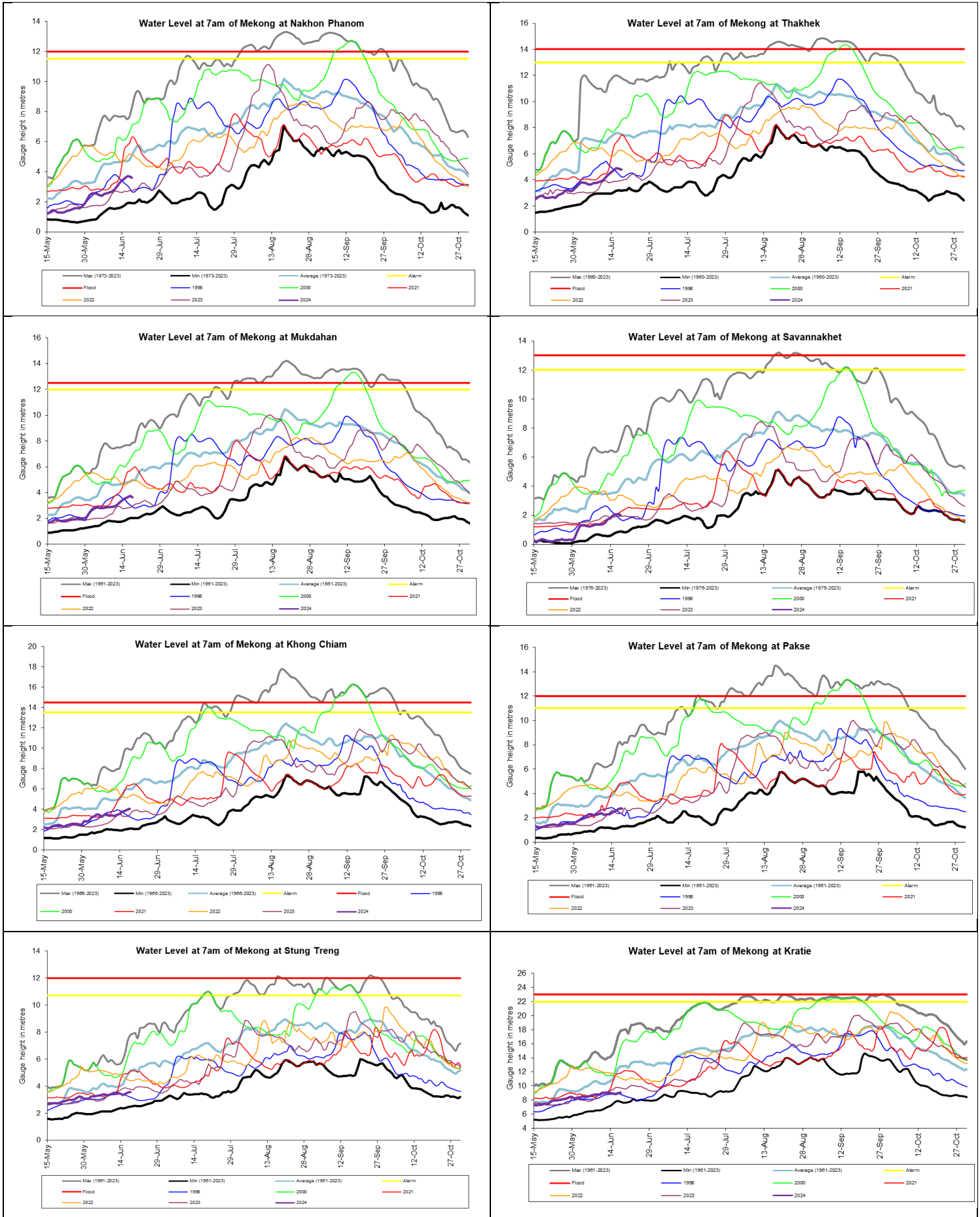
During 18-24 June 2024, the LMB was at moderate drought in some areas of the middle and lower parts. Drought specifically covered some areas of Battambang, Pursat, Khammuan, Savannakhet, Surin, Buri Ram, Nakhon Ratchasima, Gia Lai, Dak Nong, and Dak Lak. Severe drought was found in Savannakhet.

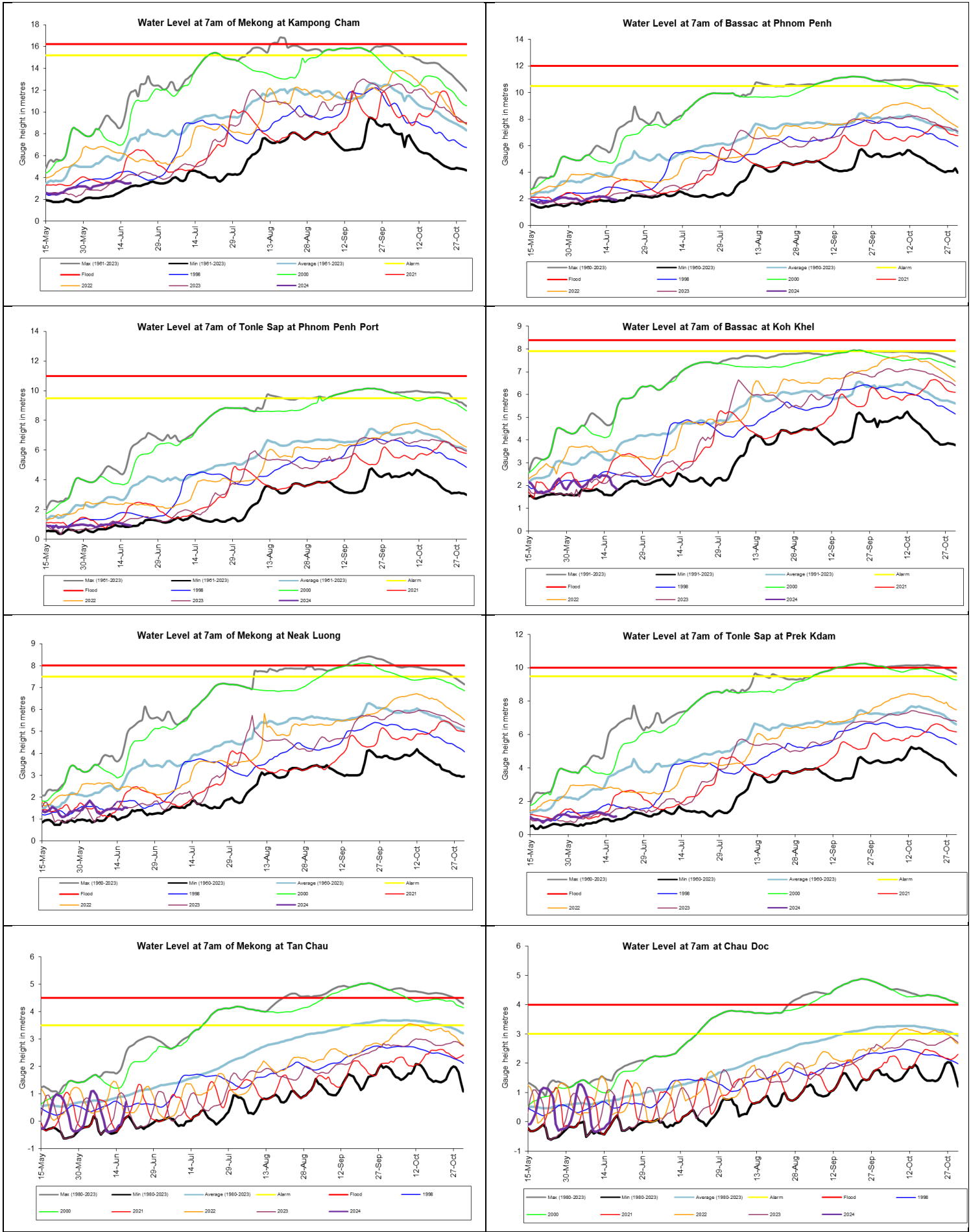
The next three-month forecast of rainfall indicates that north-eastern Cambodia, middle and southern Laos and eastern Thailand are likely receiving below average rainfall in June and July, while Cambodia is forecasted to be the wettest area which is likely receiving above average

rainfall in June and July. The forecast also indicates that the LMB might receive less than average rain specifically in the middle and south-eastern regions and southern Laos is likely the driest area in the region.

Annex A: Weekly water level monitoring at the 22 key stations







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

Table A1: Weekly observed water levels

2024	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
18-06-2024	536.71	3.43	9.50	6.02	3.58	3.33	3.90	3.59	4.78	3.65	2.02	4.06	2.78	3.58	9.05	3.52	1.93	0.94	1.82	1.52	1.09	0.71	0.87
19-06-2024	536.70	3.41	9.30	6.07	3.32	2.95	4.00	3.59	4.86	3.57	2.02	4.03	2.79	3.58	9.12	3.60	1.80	0.89	1.75	1.42	1.08	0.85	1.01
20-06-2024	536.69	3.36	9.62	6.01	3.23	2.90	3.92	3.37	4.57	3.54	2.00	3.96	2.70	3.60	9.15	3.64	1.94	0.96	1.84	1.26	1.07	0.86	1.02
21-06-2024	536.79	3.30	9.68	6.15	3.08	2.88	3.90	3.21	4.43	3.40	1.92	3.92	2.66	3.59	9.19	3.70	1.98	1.01	1.96	1.12	1.14	0.72	0.87
22-06-2024	537.23	3.16	9.64	6.34	3.19	2.88	3.94	3.07	4.27	3.31	1.89	3.90	2.65	3.56	9.18	3.76	2.07	1.09	2.14	1.24	1.22	0.70	0.85
23-06-2024	537.67	3.15	9.48	6.45	3.67	3.18	4.02	3.31	4.22	3.21	1.70	3.85	2.70	3.71	9.23	3.83	2.15	1.13	2.20	1.34	1.29	0.26	0.35
24-06-2024	537.43	3.47	9.46	6.48	3.57	3.30	4.00	3.12	4.37	3.27	1.62	3.64	2.64	3.97	9.59	3.96	2.20	1.12	2.24	1.42	1.34	0.05	-0.21
Flood level		12.80	18.00	16.00	12.50	12.00	14.50	12.50	14.00	12.50	13.00	14.50	12.00	12.00	23.00	16.20	12.00	11.00	7.90	8.00	10.00	4.50	4.00

Table A2: Weekly observed rainfall

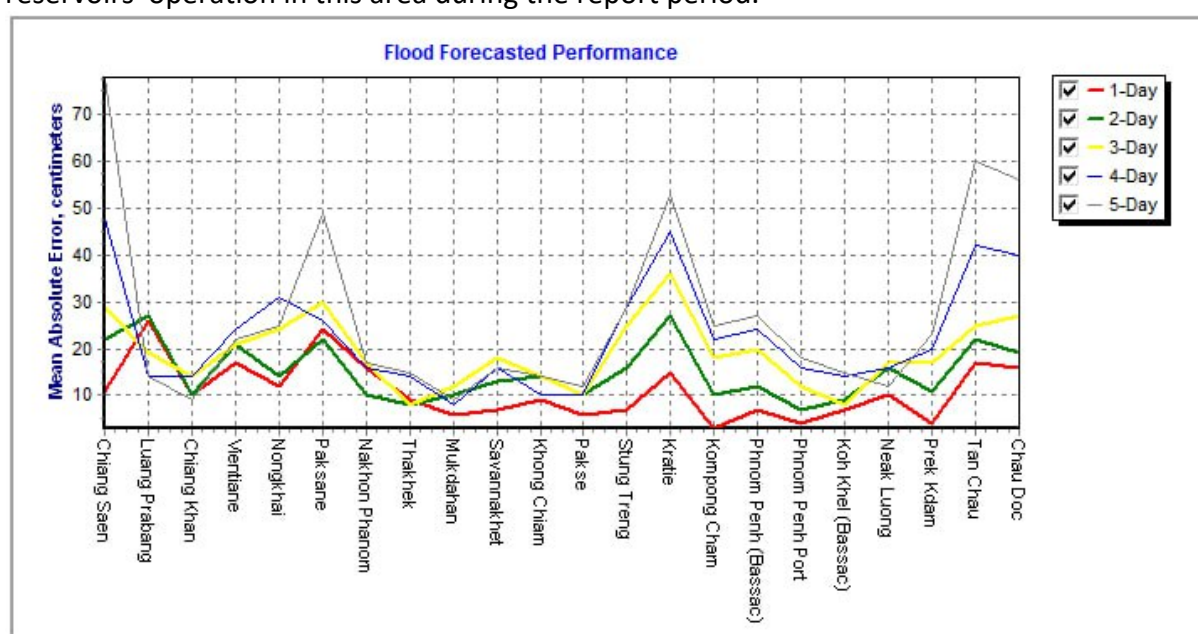
2024	Jinghong	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
18-06-2024	21	6	0	0	0	0	8	9.4	8.3	0	7.2	0	0	0	0	12.5	0		0	0	7.3	0.4	0
19-06-2024	0.5	8.2	0	0	0	0	0	5.3	0	0	3.1	0	0	1.5	0	0	0		0	13.2	0	0	0
20-06-2024	5.5	0	0	0	0	0	0	0	0	0	0	0.7	0	0	0	0	0		20	0	0	0	0
21-06-2024	0	0	0	0	0	0	0	0	0.2	0	0	0	14.8	5	0	41	6.7		0	37.4	8.2	12.7	7
22-06-2024	2	0	0	0	0	0	18	0	0	0	0	11.5	8.6	23.5	4.5	15.5	1.9		5.5	10.3	0	21.3	4
23-06-2024	0	31.2	12.8	5.2	24.2	37.3	112	13	41.1	6.5	4.6	53.5	12.2	7.1	39.5	1	0.2		5.7	1.1	0	2.5	5
24-06-2024	0	4.5	5.6	23.1	32	17	2.4	73.1	105	4	4.4	53.8	4	30	0	2	0.3		2.3	8.8	0	0.6	18
Sum	29.0	49.9	18.4	28.3	56.2	54.3	140.4	100.8	154.6	10.5	19.3	119.5	39.6	67.1	44.0	72.0	9.1	0.0	33.5	70.8	15.5	37.5	34.0

Annex C: Performance of the weekly flood forecasting

“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 18 to 24 June 2024.

The forecasting values from 18 to 24 June 2024 show that the overall accuracy is fair for a four-day to five-day forecast in lead time (less than 250 cm) for all of the stations from the upper to the lower parts of the Mekong River with combine information of rainfall and reservoirs' operation in this area during the report period.



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

- Missing rainfall in Cambodia (DOM) data and data input are not sufficient to be used for inputting into the flood forecasting model system.
- Chiang Saen station is influenced 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.



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