



Mekong River Commission

**Weekly Wet Season Situation Report
in the Lower Mekong River Basin
03 – 09 September 2024**

Prepared by
The Regional Flood and Drought Management Centre
10 September 2024

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Key Messages

Key messages for this weekly report are presented below.

Rainfall monitoring and forecast

- In the period of 03 – 09 September 2024, light to very heavy rainfall has been observed over the LMB. Especially, heavy to very heavy rain occurred in some areas in Chiang Saen, Chiang Saen, Vang Vieng, Moung Namtha, Phongsaly, Xiengkhouang, Paksane, Thakhek, Ban Tha Kok Daeng.
- From 10 – 16 September 2024, moderate to heavy rainfall is expected to occur in the LMB. Moreover, isolated heavy rainfall is expected to occur in the upper and eastern parts of the LMB during 11-13 September 2024.

Water level monitoring and forecast

- At 22 key monitoring stations along the Mekong mainstream from 03 – 09 September 2024, the water levels at other stations are in normal conditions, which do not reach alarm and flood levels. The total accumulated volume of the reverse flow to Tonle Sap Lake remains 18.17 Km³.
- In the period of 10 – 14 September 2024, water levels at upstream stations along Mekong mainstream from are likely expected to rise from Chiang Saen to Kampong Cham. From Phnom Penh Port station downward, the water levels are expected to be stable. The water levels at all stations are expected to be in normal conditions, which do not reach alarm and flood levels.

Drought condition and forecast

- From 03 - 09 September 2024, the LMB was experiencing moderate and severe droughts in the central part covering mainly Lao PDR and Cambodia. Severe drought was taking place in Khammouan and Savanakheth (Lao PDR); Siem Reap, Kampong Chhnang, Kampong Chhnang, and Preah Vihear (Cambodia). The observed drought was caused primarily by meteorological indicator.
- From 10 - 16 September: the Lower Mekong Basin is likely at normal conditions. No drought is forecasted for the whole 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 **03 – 09 September 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 03 - 09 September 2024, light to very heavy rainfall has been observed over the LMB. Especially, heavy to very heavy rain occurred in some areas in Chiang Saen, Chiang Saen, Vang Vieng, Moung Namtha, Phongsaly, Xiengkhouang, Paksane, Thakhek, Ban Tha Kok Daeng.

Figure 1 presents the mean sea level pressure over the region. A tropical storm, namely YAGI entered the Northeast Sea. On 09 September, the tropical storm Yagi weakened into a low - pressure and gradually dissipated in the upper part of Laos. It is forecasted that some areas in the Northern part of Laos are likely to have heavy rain from 11 to 12 Sep due to the impact of this low – pressure.

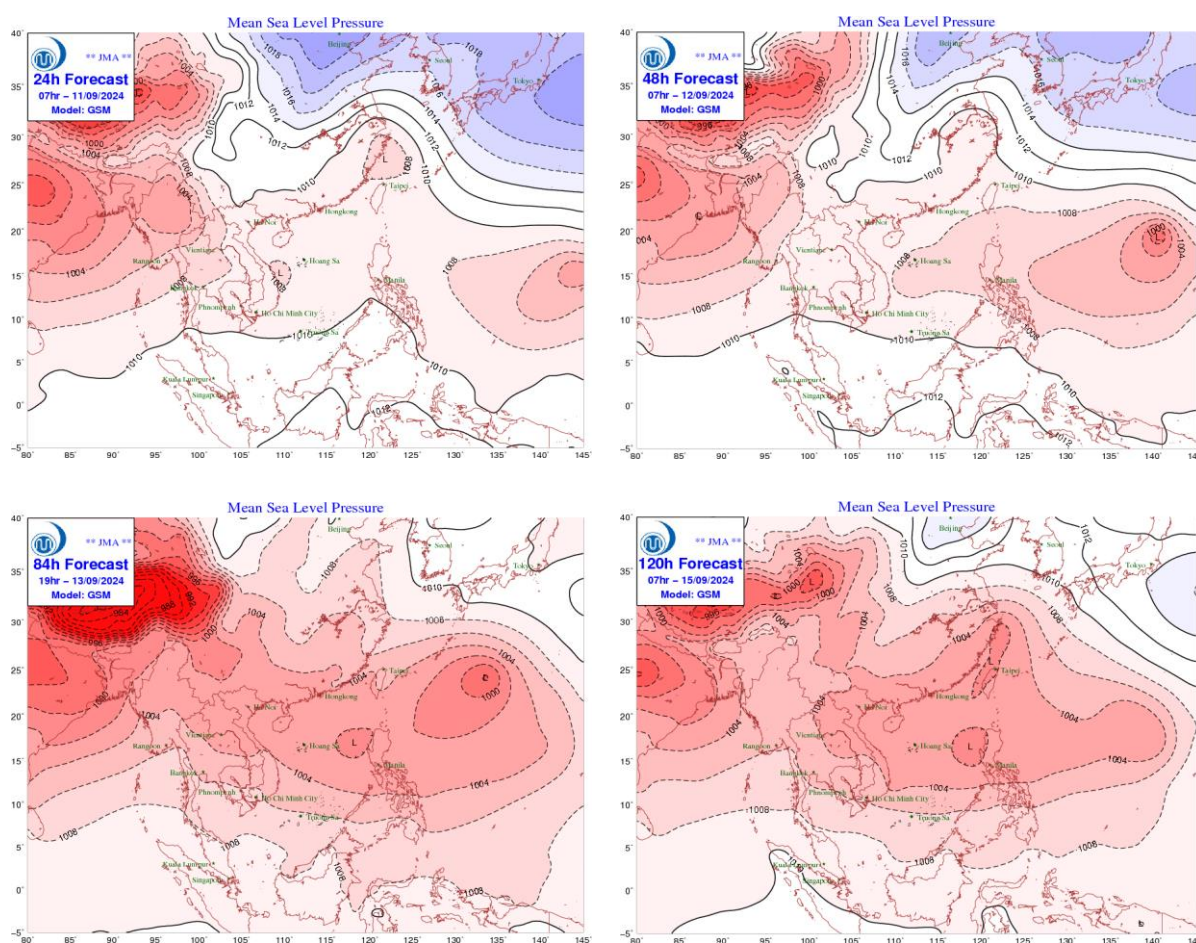


Figure 1: Weather conditions over the LMB

According to the ASEAN Specialised Meteorological Centre (ASMC, <http://asmc.asean.org/home/>), the subseasonal weather outlook (02 – 15 September 2024) indicates that wetter conditions is expected to from lower to central part of the LMB, while warmer conditions are predicted at the upper part. **Figure 2** shows the outlook of weather condition from 02 – 15 September 2024 in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

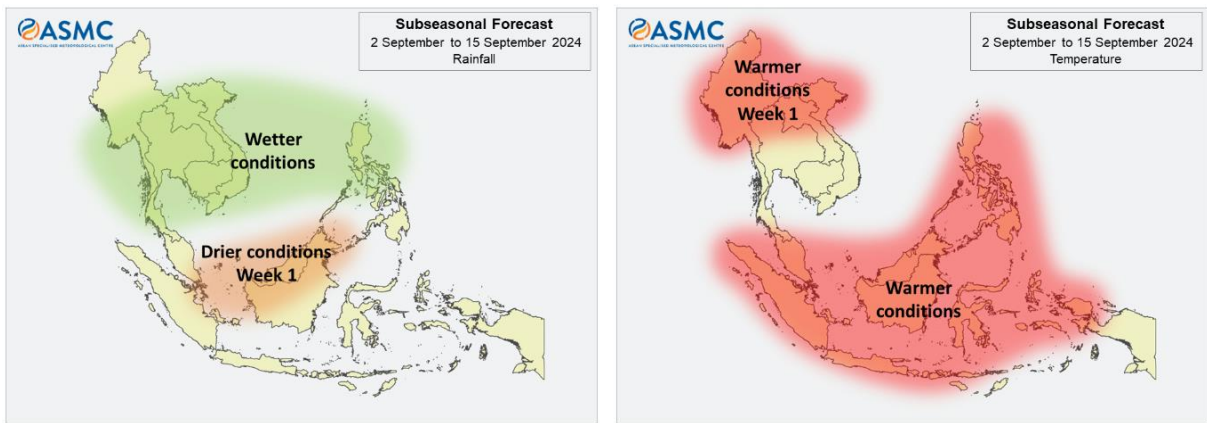


Figure 2: Outlook of wet and dry conditions over the Asian countries by ASMC.

Based on the tropical storm risk (TS) (<https://www.tropicalstormrisk.com/>), there is one active NW pacific system as of 09 September 2024 as displayed in **Figure 3**. However, this tropical storm may not affect the LMB.

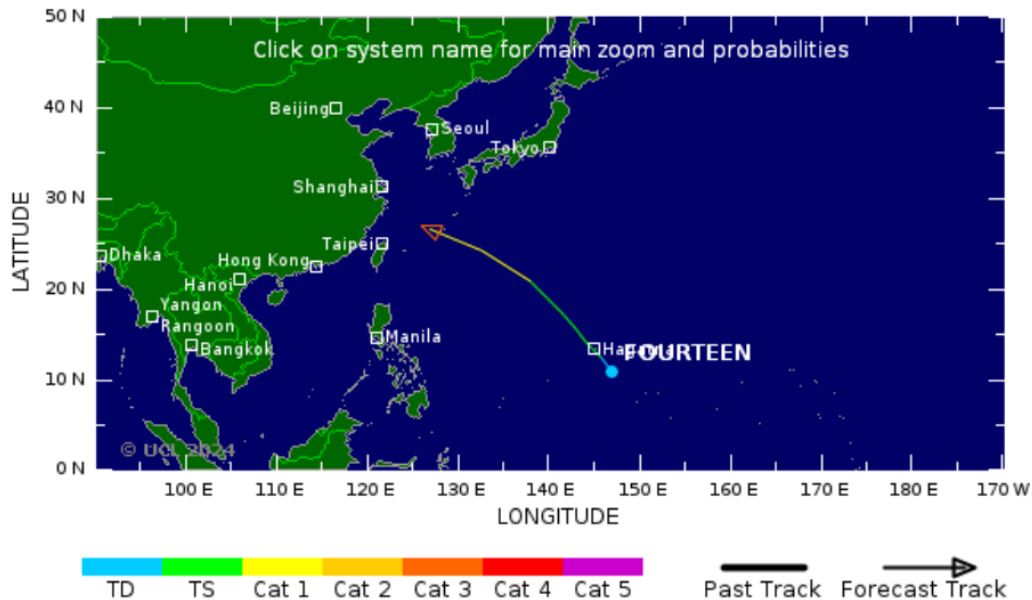


Figure 3: One tropical storm risk observed on 09 September 2024

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 03 - 09 September 2024 (**Figure 4**). Light to very heavy rainfall has been observed over the LMB. Especially in the period on 09 September, due to the active of low - pressure, heavy to very heavy rain occurred in the Northern part of Laos and Thai land, including Chiang Rai, Chiang Saen, Xiengkhouang, Thakhek, Ban Tha Kok Daeng, Nakhon Phanom, Ban Phone Si, Saravanne, Sekong, Pleiku.

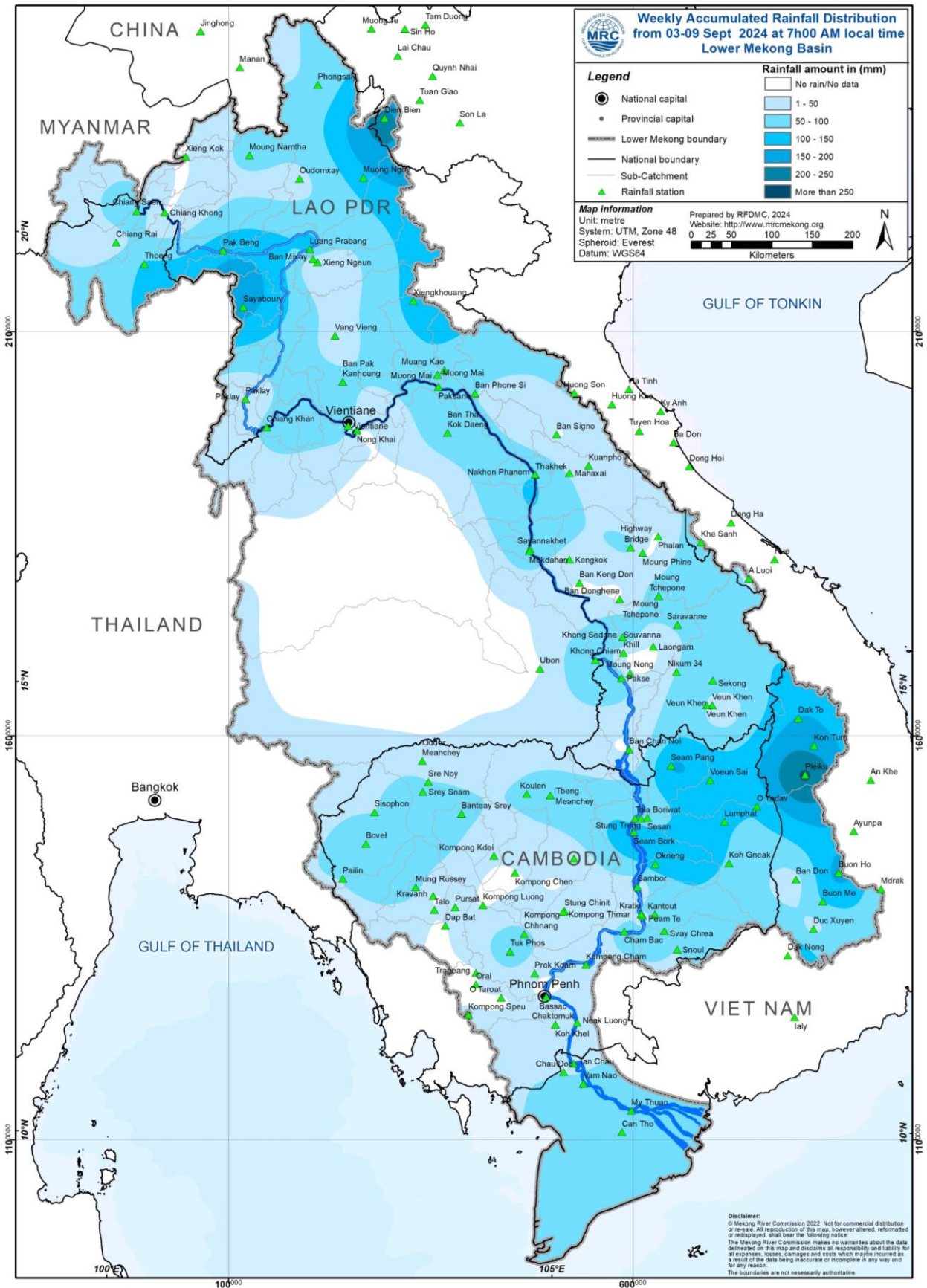


Figure 4: Weekly rainfall distribution over the LMB during 03 – 09 September 2024

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 03 – 09 September 2024, the observed water level (WL) at Jinghong hydrological station¹, was almost constant and ranges between 536.61 m and 535.94 m, which are corresponding to the outflow between 1,840.00 m³/s to 1,320.00 m³/s (recorded on 7:00 am), respectively (**Figure 6**). The water level in Chiang Saen station also indicated a fluctuation ranging from 5.13 m to 4.36 m. At the same period, the water level in Luang Prabang station also increased with an approximate value of 0.72 m from 13.94 m to 14.66 m as compared to the previous week.

During the same period, the water levels observed at stations from Chiang Khan to Paksane have been decreasing. At Chiang Khan, Vientiane, Nongkhai, and Paksane, water levels have decreased from 12.13 m to 11.28 m, 9.70 m to 8.05 m, 10.67 m to 8.83 m, and 11.66 m to 9.85 m, respectively. Moreover, from Nakhon Phanom downward, water levels have been increasing. At Nakhon Phanom, Thakhek, Mukdahan, Savannakhet, Khong Chiam, Pakse, and Stung Treng, the water levels have decreased from, 10.58 m to 8.96 m, 11.73 m to 10.03 m, 10.10 m to 8.58 m, 8.55 m to 6.99 m, 10.99 m to 9.84 m, 8.88 m to 7.96 m, and 7.97 m to 7.77 m, respectively. Moreover, in the floodplain areas, at Kampong Cham, Phnom Penh Port, Phnom Penh Bassac, Neak Luong, Koh Khel, and Prek Kdam, water levels have also increased from 11 m to 11.5 m, 6.84 m to 7.25 m, 5.63 m to 6.0 m, 6.19 m to 6.56 m, 4.76 m to 5.12 m, and 5.87 m to 6.24 m, respectively.

From to the previous week, the water levels from 03 to 09 September 2024 at Viet Nam's Tan Chau and Chau Doc, water levels have decrease from 2.18 m to 2.06 m and from 2.16 m to 1.84 m, respectively.

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>.

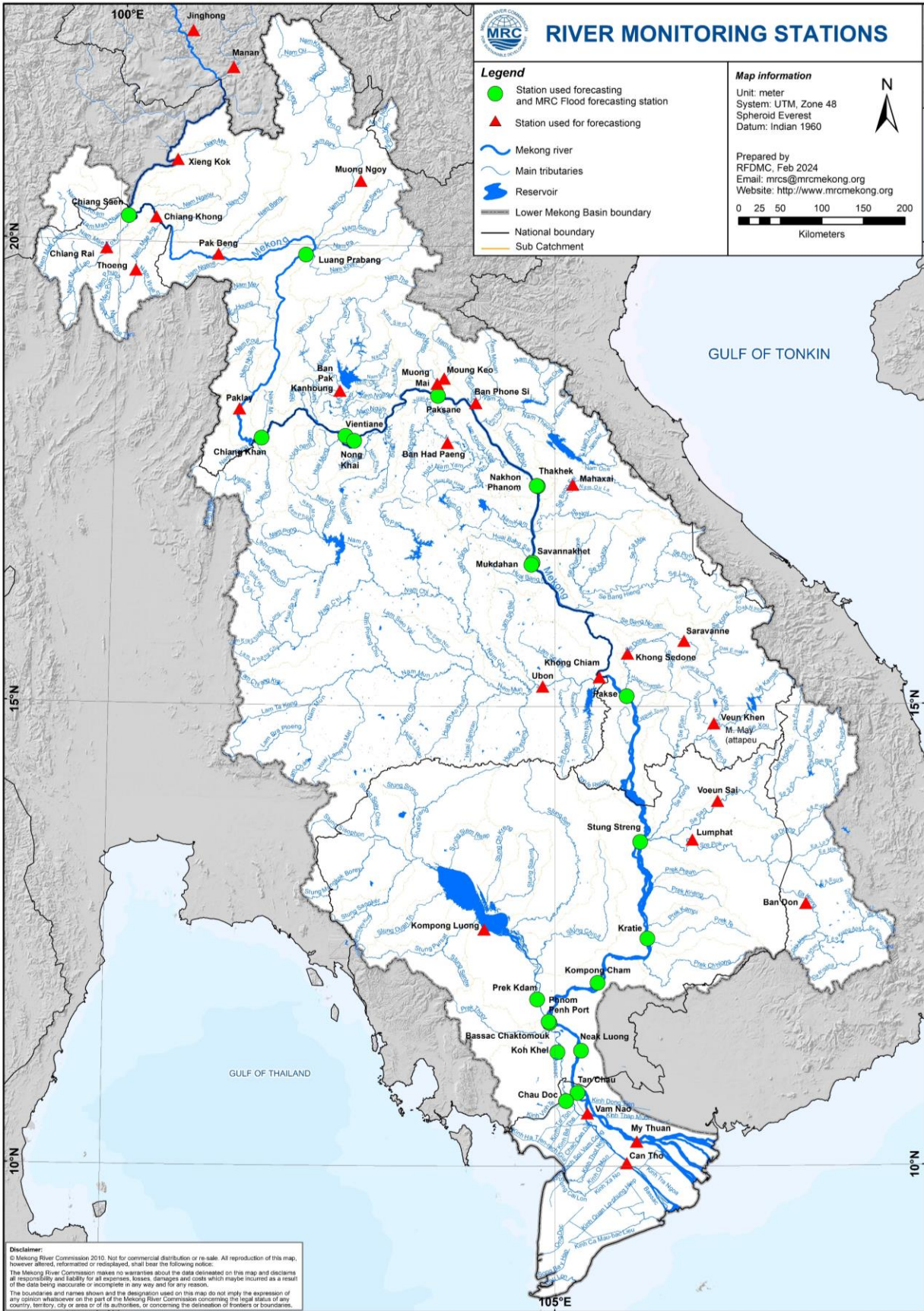


Figure 5: The key stations along LMB for river flood forecasting

The water levels in key monitoring stations on 09 September, water levels at all stations have returned to normal conditions, which do not reach alarm nor flood levels. However, at other stations, the water levels are in normal conditions, which do not reach alarm and flood levels. 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**.

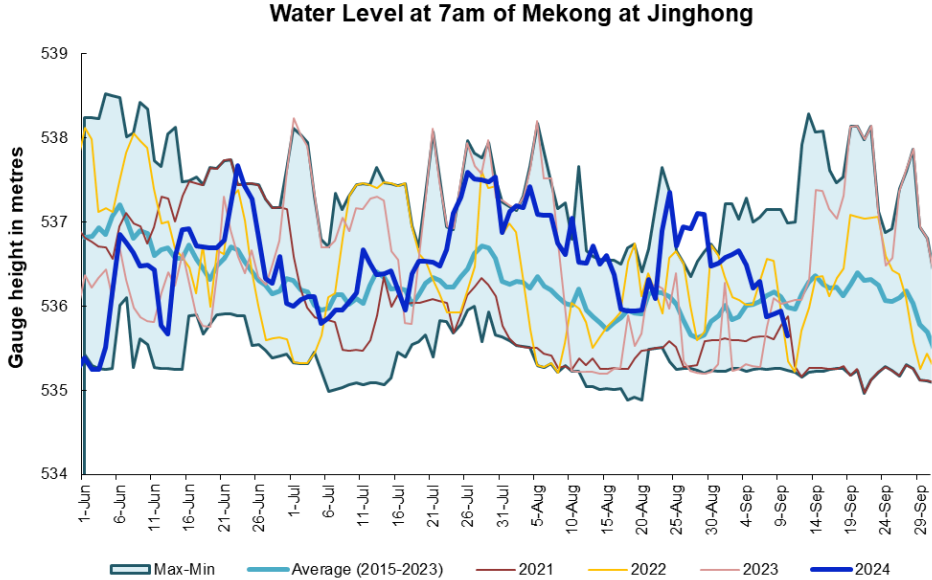


Figure 6. Water level at the Jinghong hydrological station up to 09 September 2024.

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 inflow/reverse of the Tonle Sap Lake took place since 29 June 2024.

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 7**. The reversed flow to the lake has returned since 30 August 2024 with accumulated volume of 18.17 Km³. This may be resulted from high water contribution from upstream part of the LMB due to high rainfall in the past weeks.

The seasonal changes in monthly flow volumes up to 09 September 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 August 2024 is lower than its LTA (about 67.32 %), 2019, 2021, 2022 and 2023 but higher than only that in 2020 during the same period (**Figure 8 and Table 1**). However, updated until 09 September 2024, the volume of the lake is approximately 54.34% of its LTA in September.

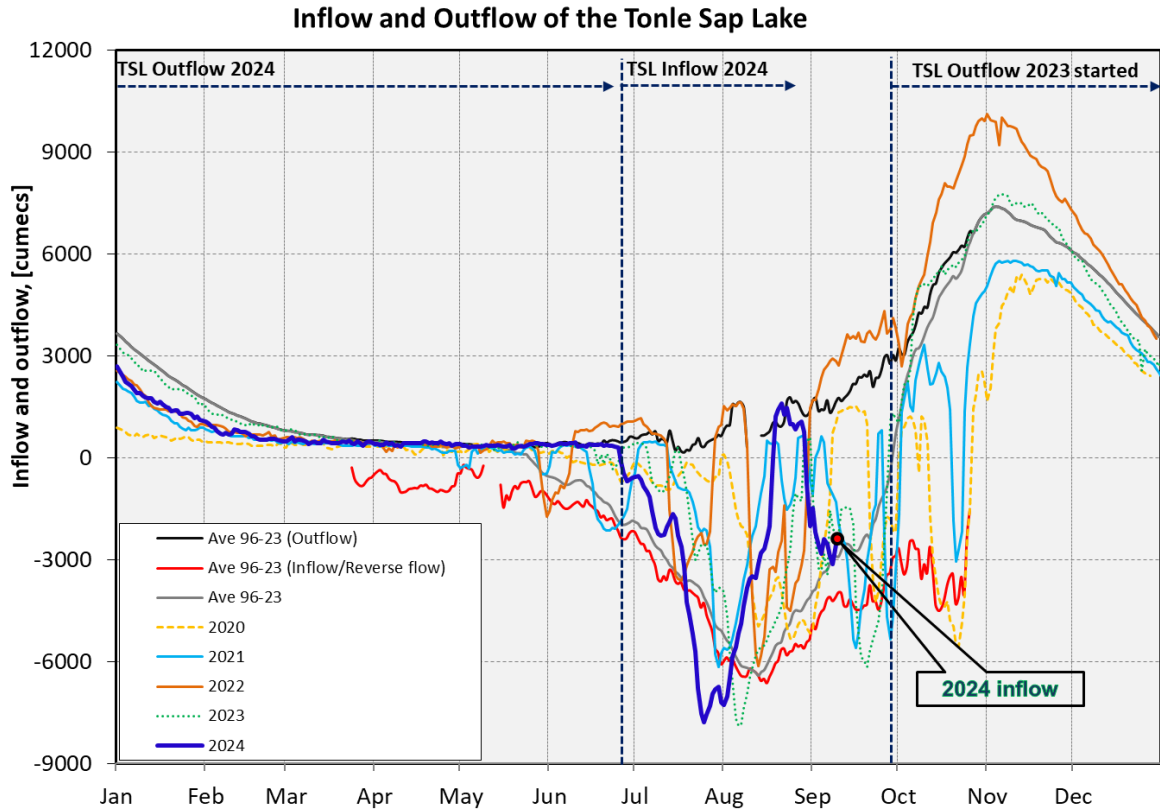


Figure 7: Seasonal change of inflows and outflows of Tonle Sap Lake.

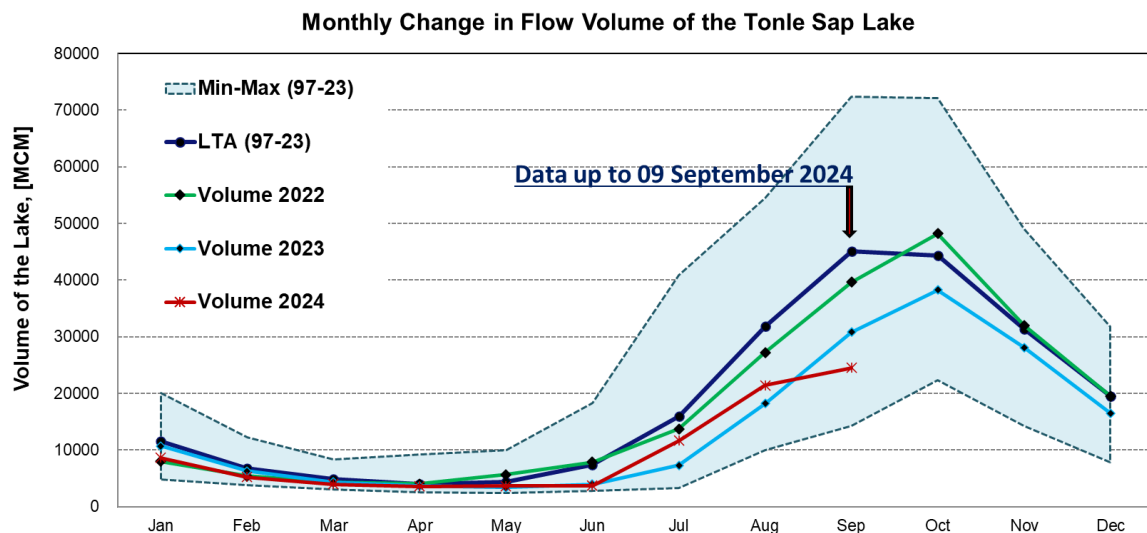


Figure 8. The seasonal change in monthly volume of Tonle Sap Lake.

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	11487.13	20039.88	4796.69	7998.69	4796.69	7405.81	7998.69	10700.62	8610.88	74.96
Feb	6697.79	12266.87	3757.30	4954.90	3757.30	4671.15	5405.65	6309.00	5211.05	77.80
Mar	4822.51	8340.62	3030.40	3936.30	3259.79	4147.46	4330.50	4299.86	3936.30	81.62
Apr	4033.80	9203.09	2552.38	3317.61	2635.83	3259.79	4026.48	3609.52	3580.11	88.75
May	4376.15	9938.04	2441.69	3317.61	2469.30	3462.96	5668.52	3404.68	3609.52	82.48
Jun	7357.50	18344.65	2775.77	3580.11	2832.04	4765.22	7886.07	3936.30	3698.04	50.26
Jul	16001.18	40825.01	3230.96	4269.27	3230.96	7333.01	13751.91	7260.51	11671.87	72.94
Aug	31847.52	54529.13	10021.39	12266.87	10021.39	12453.19	27226.87	18168.63	21440.19	67.32
Sep	45088.00	72427.44	14251.59	35070.22	14251.59	22430.63	39624.67	30811.08	24501.32	54.34
Oct	44317.53	72124.19	22296.87	25074.27	28782.41	32331.33	48230.13	38255.90		
Nov	31391.74	49030.83	14302.12	14302.12	23867.31	25218.90	31989.11	28075.12		
Dec	19550.90	31734.10	7886.07	7886.07	13900.73	15599.94	19545.75	16466.19		
	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 Km ³)										

Remarks: the monthly volume of Tonle Sap Lake in 2024 is updated until 09 Sept 2024.

4. Flash Flood in the Lower Mekong Basin

During the weekly monitoring period from 03 - 09 September 2024, the LMB received light to very heavy rain in some areas in the upper parts of the LMB.

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 during this period, the reporting period as shown in [Figure 14](#) and [Table 2](#).

Table 2. Detected moderate to high-risk flash flood in Cambodia PDR on 09 September

FLASH FLOOD GUIDANCE IN THE LOWER MEKONG BASIN								
In the next 1hrs			In the next 3hrs			In the next 6hrs		
Provinces	Districts	Level	Provinces	Districts	Level	Provinces	Districts	Level
Khammuane	Xaybouath	Moderate	Khammuane	Xaybouath	Moderate	Khammuane	Xaybouath	Moderate
Luangnamtha	Long	Moderate	Luangnamtha	Sing	High	Luangnamtha	Sing	High
Luangnamtha	Sing	High	Xiengkhuang	Morkmay	Moderate	Xiengkhuang	Morkmay	Moderate
Luangnamtha	Viengphou	Moderate	Xiengkhuang	Pek	Moderate	Xiengkhuang	Pek	Moderate
Phongsaly	Bountay	Moderate						

FLASH FLOOD GUIDANCE IN THE LOWER MEKONG BASIN								
In the next 1hrs			In the next 3hrs			In the next 6hrs		
Provinces	Districts	Level	Provinces	Districts	Level	Provinces	Districts	Level
Vientiane	Kasy	Moderate						
Xiengkhuang	Morkmay	Moderate						
Xiengkhuang	Pek	Moderate						
Xiengkhuang	Souy	Moderate						

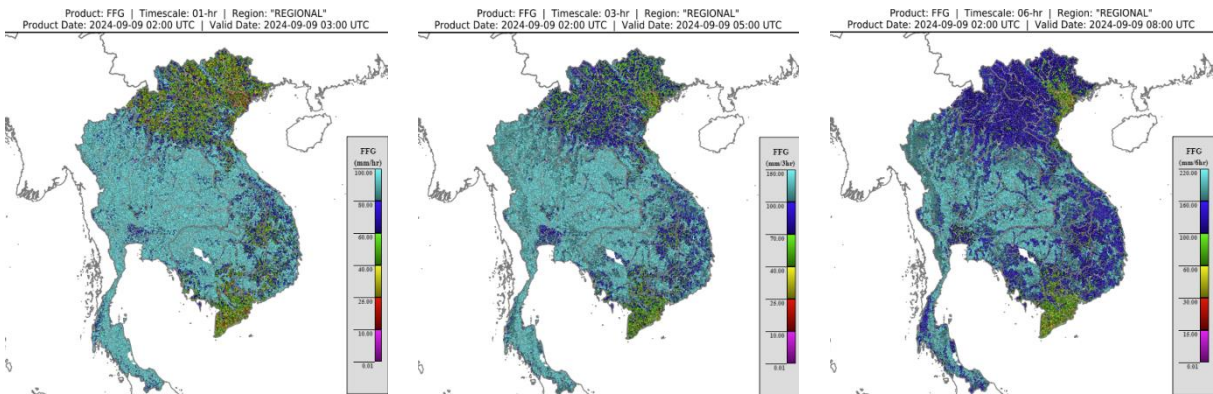


Figure 9. Flash Flood risk for the next 12-hr and 24-hr on 09 September

5. Drought Monitoring in the Lower Mekong Basin

5.2. Weekly drought monitoring from 03 - 09 September 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 03 - 09 September, the LMB was facing some moderate and severe meteorological droughts in southern Lao PDR and eastern Cambodia. Severe drought was taking place over Khammouan and Savanakheth (Lao PDR); Siem Reap, Kampong Chhnang, Kampong Chhnang, and Preah Vihear (Cambodia).

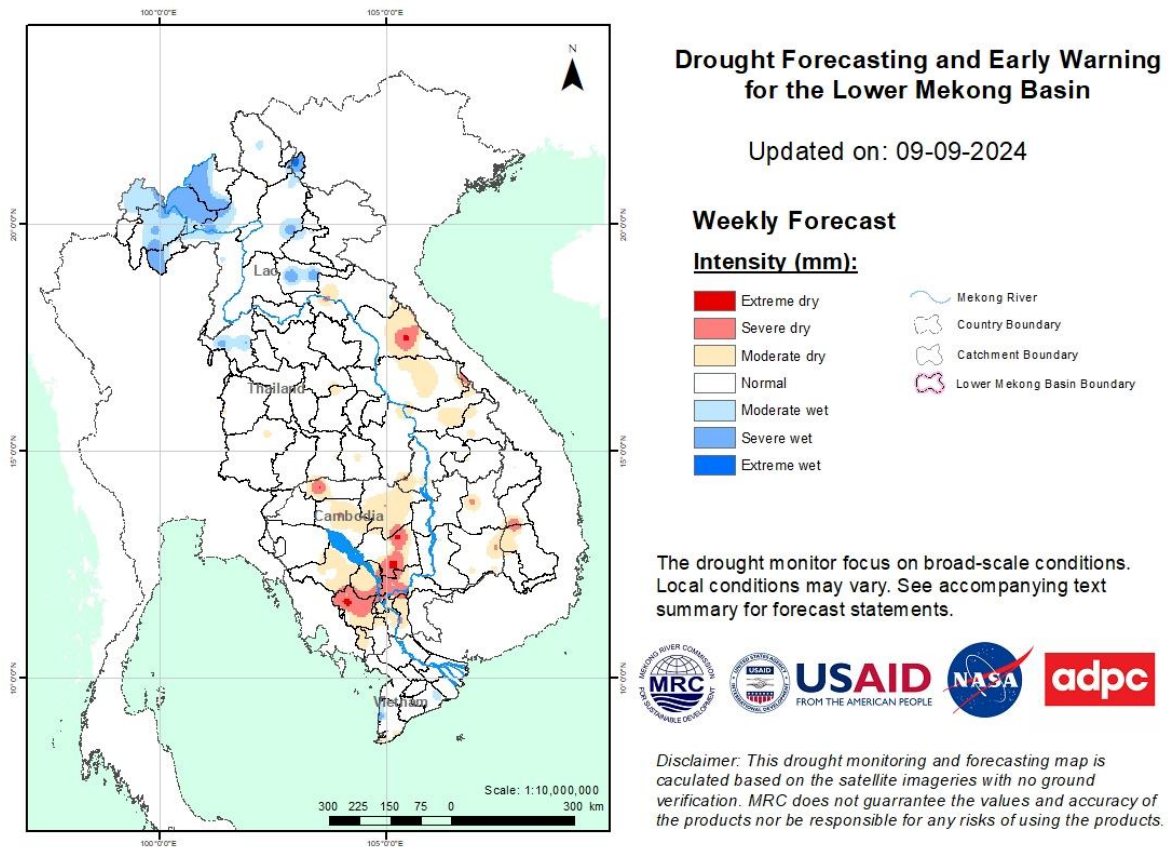
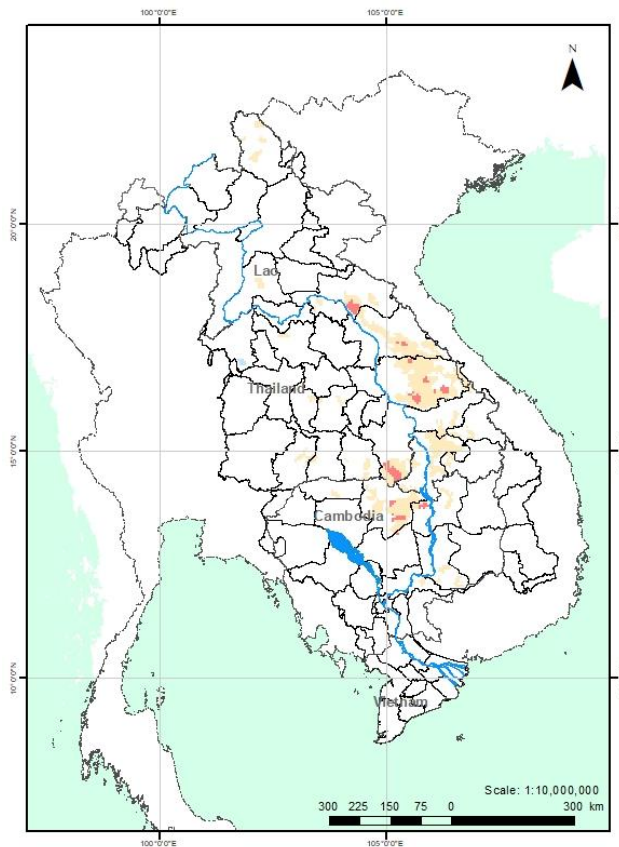


Figure 10: Weekly standardized precipitation index from 03 – 09 September.

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

There were some moderate and severe agricultural droughts taking place during the monitoring week from 03 – 09 September 2024 and mainly in southern Lao PDR and eastern Cambodia, see **Figure 10**.



Drought Forecasting and Early Warning for the Lower Mekong Basin

Updated on: 09-09-2024

Weekly Forecast

Intensity (mm):



The drought monitor focus on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



Disclaimer: This drought monitoring and forecasting map is calculated based on the satellite imageries with no ground verification. MRC does not guarantee the values and accuracy of the products nor be responsible for any risks of using the products.

Figure 11: Weekly Index of Soil Water Fraction from 03 – 09 September.

- Weekly Combined Drought Index (CDI)**

The combined drought indicator, **Figure 11**, shows that the LMB was experiencing moderate and severe droughts over the southern part. Severe drought was taking place in Kampong Thom, Kratie, and Stung Treng of Cambodia; Champasack, Khammouan, and Savanakheth of Lao PDR. The observed drought was caused primarily by meteorological indicator.

The impacted areas are listed below:

Number	Country	Province	Mderate	Severe	Extreme	Exceptional	Number	Country	Province	Mderate	Severe	Extreme	Exceptional	Number	Country	Province	Mderate	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			S	
3	Cambodia	Kampong Cham					26	Lao PDR	Xayaburi					49	Thailand	Bueng 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	Savanakhet					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	Svai Rieng					39	Thailand	Chiang Rai					62	Viet Nam	Gia Lai				
17	Cambodia	Stung Treng		S			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											
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

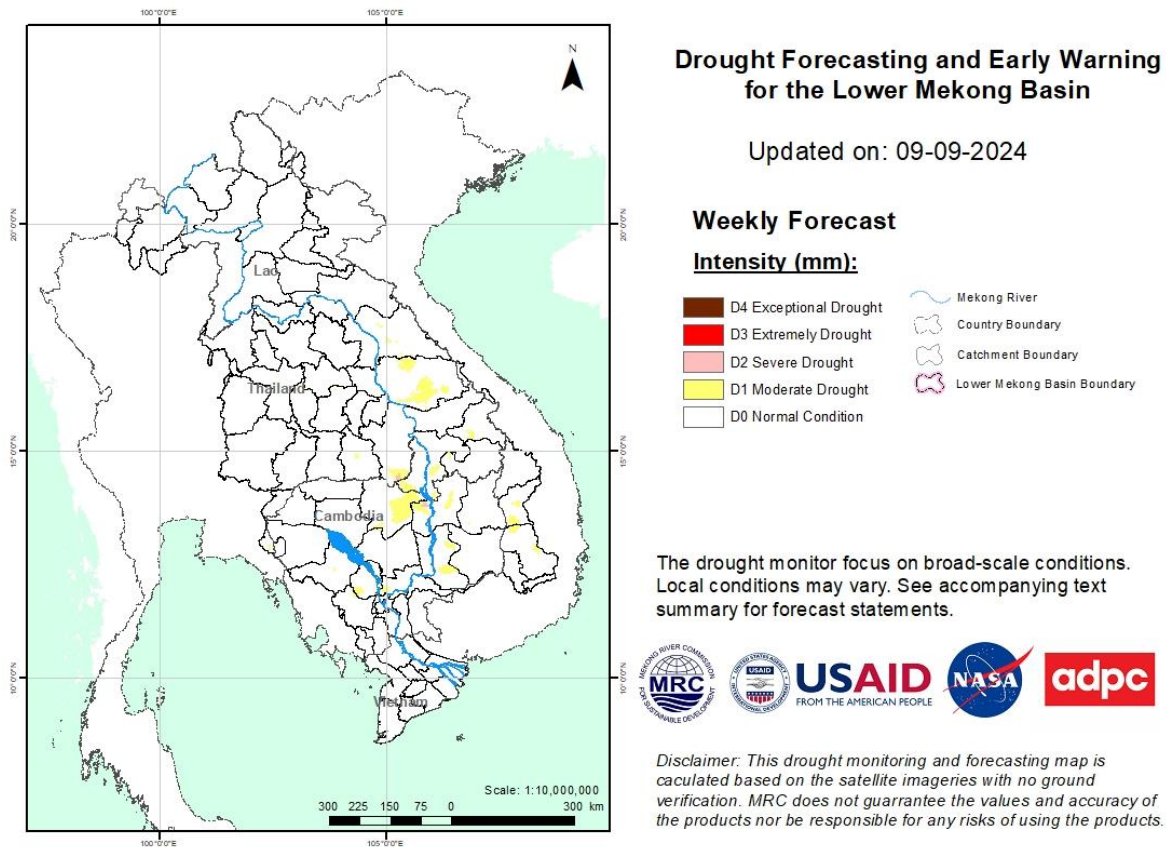


Figure 12: Weekly Combined Drought Index from 03 - 09 September.

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 10 – 14 September 2024, the accumulated rainfall over the entire Lower Mekong Basin is distributed with light to heavy rain based on CHIRPS-GFS (**Figure 12**). The accumulated rainfall over the entire Lower Mekong Basin is distributed with moderate to heavy rain and thunderstorms. Moreover, isolated heavy rainfall is expected to occur in the upper and eastern parts of the LMB during 11-13 September 2024.

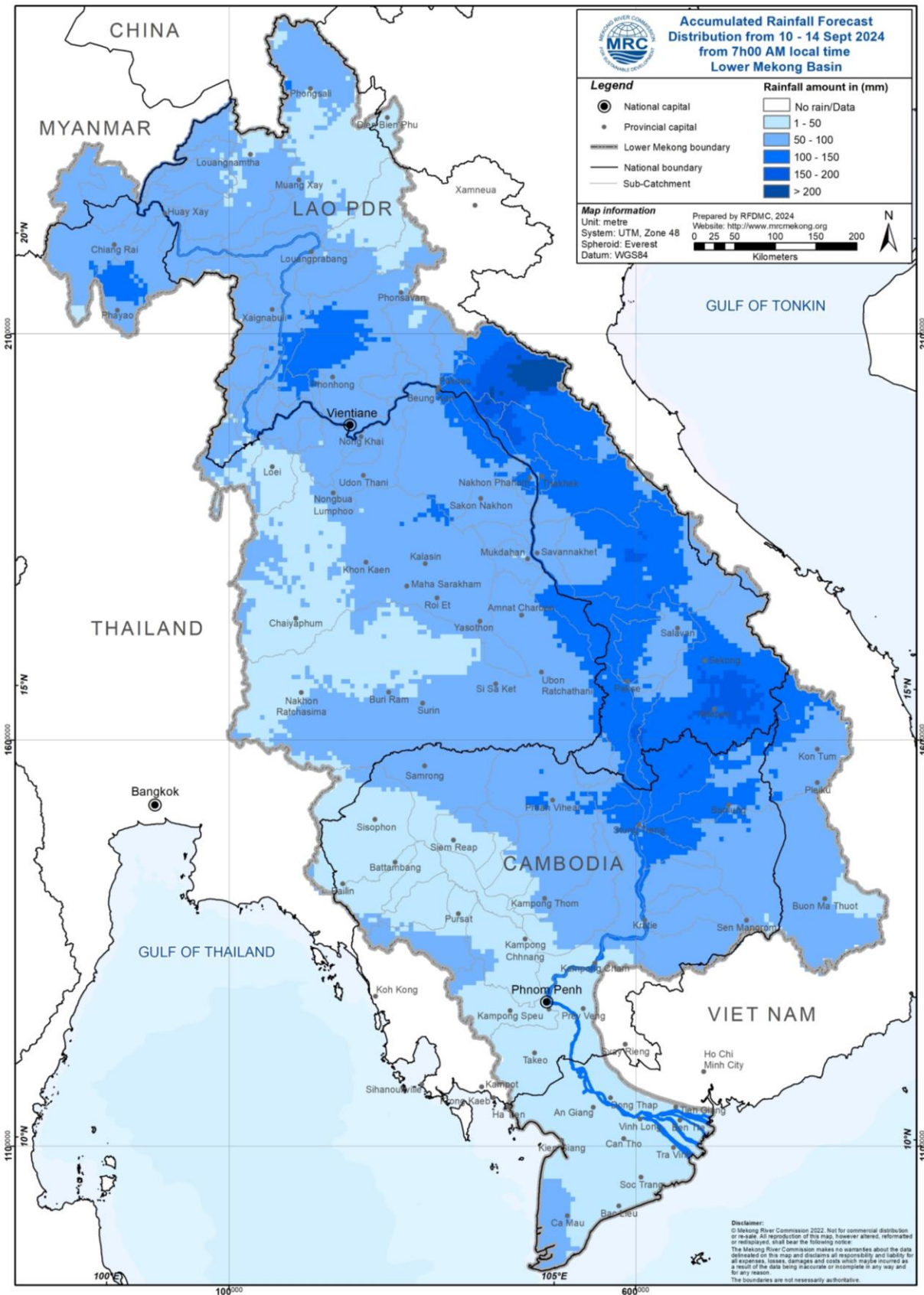


Figure 13: Accumulated rainfall forecast from CHIRPS-GEFS (10 – 14 September 2024)

6.2 Water level forecast

The five-day forecast is carried out from 10 to 14 September 2024 for 22 forecasting station along the Mekong mainstream. Overall, water levels at central to upstream stations from Chiang Saen to Kampong Cham are expected to increase, while from Kampong Cham downward are expected to either be stable or decreasing.

At Chiang Saen, Luang Prabang, and Chiang Khan stations, water levels are expected to rise with approximated value of 0.50 m, 0.98 m, and 0.94 m, respectively. Moreover, at Vientiane, Nongkhai, Paksane, Nakhon Phanom, Thakhek, Mukdahan, Savannakhet, Khong Chiam, Pakse, Stung Treng, Kratie, and Kompong Cham, the water levels are also expected to rise with approximated value of 1.10, 1.12 m, 0.81 m, 0.61 m, 0.72 m, 0.58 m, 0.55 m, 0.65 m, 0.50, 0.29 m, 0.11 m, and 0.26 m, respectively.

Moving downstream at Phnom Penh Port, Phnom Penh Bassac, Neak Luong, Koh Khel and Prek Kdam, water levels are also expected to be stable as compared from previous week.

For the Tan Chau station on the Mekong River and Chau Doc station on the Bassac River, water levels are also expected to be stable as well.

The weekly River Monitoring Bulletin and forecasting issued on 09 September 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

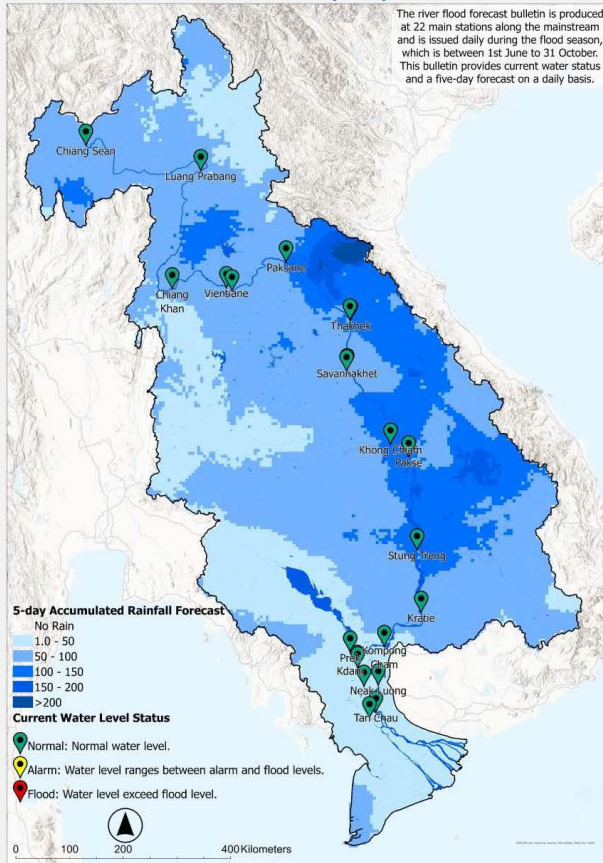


MEKONG RIVER MONITORING AND FORECASTING BULLETIN

Monitoring on 09 September 2024

Highlights: Water levels at all stations along mainstream are in normal conditions, which do not neither reached alarm nor flood levels. The total accumulated volume of reverse flow to Tonle Sap Lake is **18.17 Km³**.

THE FORECASTING HYDROLOGICAL STATION MAP OF THE LOWER MEKONG BASIN (LMB)



Remarks: The river flood forecast bulletin is produced at 22 main stations along the mainstream and is issued daily during the flood season, which runs from 1st June to 31st October. This bulletin provides information on the current water level status and a five-day forecast on a daily basis.

WATER LEVEL STATUS DEFINITIONS

Normal	Normal water level.
Alarm	Alarm when the water level ranges between alarm and flood levels.
Flood	Flood is when the flood level exceeds. A flood level is determined by member countries.

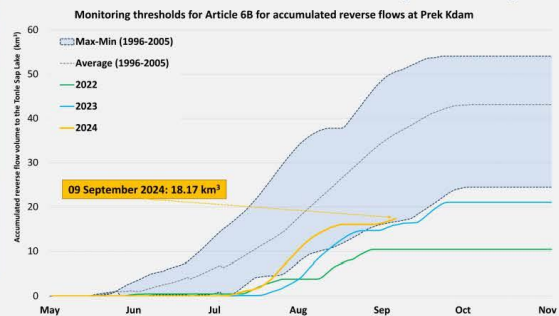
CURRENT WATER LEVEL STATUS

Monitoring Station	Water Level	Flow Threshold (PMFM*6C)
Jinghong	-	-
Chiang Saen	Normal	Normal
Luang Prabang**	Normal	-
Chiang Khan	Normal	-
Vientiane	Normal	Normal
Nongkhai	Normal	-
Paksane	Normal	-
Nakhon Phanom	Normal	-
Thakhek	Normal	-
Mukdahan	Normal	-
Savannakhet	Normal	-
Khong Chiam	Normal	Normal
Pakse	Normal	Normal
Stung Treng	Normal	Normal
Kratie	Normal	Normal
Kompong Cham	Normal	-
Phnom Penh (Bassac)	Normal	-
Phnom Penh Port	Normal	-
Koh Khel	Normal	-
Neak Luong	Normal	-
Prek Kdam	Normal	-
Tan Chau	Normal	-
Chau Doc	Normal	-

* Procedures for Maintenance of Flows on the Mainstream

** Luang Prabang station is influenced by hydropowers at its upstream and downstream

REVERSE FLOW VOLUME PREK K DAM (PMFM*6B)



Accumulated reverse flow volume at Prek Kdam

Flow volumes on 09 September 2024:	18.17 Km ³
Minimum reverse flow volume (1996-2005):	23.848 Km ³
Average reverse flow volume (1996-2005):	42.84 Km ³
Maximum reverse flow volume (1996-2005):	54.046 Km ³

*Procedures for Maintenance of Flows on the Mainstream

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<http://www.mrcmekong.org/>
http://fw.mrcmekong.org/bulletin_wet.php
<http://fw.mrcmekong.org/reportflood.php>
<https://pmfm.mrcmekong.org/>

DISCLAIMER

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MEKONG RIVER MONITORING AND FORECASTING BULLETIN

Forecasting from 10 to 14 September 2024

Highlights: In the next five days, water levels at all upstream stations are expected to stay in normal conditions. The forecast is not expected to have any stations reaching alarm and flood 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)	Min. distance to alarm level within next 5 days (m)	Min. distance to flood level within next 5 days (m)	
			08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	13-Sep	14-Sep							
Jinghong	2.0	-	535.91	→ 535.94	-	-	-	-	-	-	-	-	-	-	-	-
Chiang Saen	26.1	357.110	4.34	→ 4.36	→ 4.40	→ 4.32	↑ 4.46	↑ 4.57	↑ 4.86	11.50	12.80	↑ 0.50	0.50	6.64	7.94	
Luang Prabang	110.8	267.195	13.38	↑ 14.66	↑ 14.90	↑ 15.25	↑ 15.39	↑ 15.51	↑ 15.64	17.50	18.00	↑ 0.98	0.98	1.86	2.36	
Chiang Khan	0.0	194.118	10.91	↑ 11.28	↑ 11.50	↑ 11.68	↑ 11.81	↑ 12.02	↑ 12.22	14.50	16.00	↑ 0.94	0.94	2.28	3.78	
Vientiane	0.0	158.040	8.09	↓ 8.05	↑ 8.23	↑ 8.57	↑ 8.85	↑ 9.01	↑ 9.15	11.50	12.50	↑ 1.10	1.10	2.35	3.35	
Nongkhai	0.0	153.648	8.90	↓ 8.83	↑ 9.05	↑ 9.40	↑ 9.68	↑ 9.83	↑ 9.95	11.40	12.20	↑ 1.12	1.12	1.45	2.25	
Paksane	0.0	142.125	10.08	↓ 9.85	↓ 9.70	↑ 9.85	↑ 10.20	↑ 10.51	↑ 10.66	13.50	14.50	↑ 0.81	0.81	2.84	3.84	
Nakhon Phanom	0.0	130.961	9.26	↓ 8.96	↓ 8.78	→ 8.82	↑ 9.15	↑ 9.35	↑ 9.57	11.50	12.00	↑ 0.61	0.61	1.93	2.43	
Thakhek	nr	129.629	10.23	↓ 10.03	↑ 9.85	→ 9.90	↑ 10.23	↑ 10.54	↑ 10.75	13.00	14.00	↑ 0.72	0.72	2.25	3.25	
Mukdahan	0.0	124.219	8.74	↓ 8.58	→ 8.48	→ 8.40	↑ 8.68	↑ 8.98	↑ 9.16	12.00	12.50	↑ 0.58	0.58	2.84	3.34	
Savannakhet	0.0	124.219	7.16	↓ 6.99	↓ 6.88	→ 6.80	↑ 7.08	↑ 7.36	↑ 7.54	12.00	13.00	↑ 0.55	0.55	4.46	5.46	
Khong Chiam	0.0	89.030	9.92	↓ 9.84	↓ 9.72	↓ 9.59	↑ 9.72	↑ 10.05	↑ 10.49	13.50	14.50	↑ 0.65	0.65	3.01	4.01	
Pakse	3.6	86.490	8.10	↓ 7.96	↓ 7.88	↓ 7.76	↑ 7.83	↑ 8.12	↑ 8.46	11.00	12.00	↑ 0.50	0.50	2.54	3.54	
Stung Treng	8.0	36.790	8.06	↓ 7.77	↓ 7.50	↓ 7.42	→ 7.44	↑ 7.68	↑ 8.06	10.70	12.00	↑ 0.29	0.29	2.64	3.94	
Kratié	28.6	-0.101	18.46	↓ 18.08	↓ 17.75	↓ 17.42	↓ 17.39	↑ 17.65	↑ 18.19	22.00	23.00	↑ 0.11	0.11	3.81	4.81	
Kompong Cham	0.0	-0.930	11.65	↓ 11.50	↓ 11.34	↓ 11.25	↑ 11.32	↑ 11.57	↑ 11.76	15.20	16.20	↑ 0.26	0.26	3.44	4.44	
Phnom Penh (Bassac)	0.0	-1.020	7.25	→ 7.25	→ 7.23	→ 7.20	→ 7.18	→ 7.18	↑ 7.24	10.50	12.00	→ -0.01	-0.01	3.26	4.76	
Phnom Penh Port	nr	0.070	6.02	↓ 6.00	↓ 5.97	→ 5.94	→ 5.92	→ 5.92	↑ 5.98	9.50	11.00	→ -0.02	-0.02	3.52	5.02	
Koh Khel	0.0	-1.000	6.56	→ 6.56	→ 6.55	→ 6.54	→ 6.53	→ 6.52	→ 6.54	7.90	8.40	→ -0.02	-0.01	1.35	1.85	
Neak Luong	0.0	-0.330	5.14	↓ 5.12	→ 5.11	→ 5.10	→ 5.09	→ 5.08	→ 5.10	7.50	8.00	→ -0.02	-0.01	2.39	2.89	
Prek Kdam	0.0	0.080	6.25	↓ 6.24	→ 6.24	→ 6.23	→ 6.22	→ 6.23	→ 6.26	9.50	10.00	→ 0.02	0.02	3.24	3.74	
Tan Chau	0.7	0.000	2.07	↓ 2.06	→ 2.06	→ 2.05	→ 2.04	→ 2.04	→ 2.04	3.50	4.50	→ -0.02	0.00	1.44	2.44	
Chau Doc	4.3	0.000	1.83	→ 1.84	→ 1.84	→ 1.84	→ 1.84	→ 1.84	→ 1.84	3.00	4.00	→ 0.00	0.00	1.16	2.16	

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 Kratié 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

- On **09 September**, water levels at all stations are in normal conditions. The total accumulated reverse flow to Tonle Sap Lake is **18.17 Km³**.
- For **10-14 September**, moderate to heavy rainfall is expected to occur in the LMB. Moreover, isolated heavy rainfall is expected to occur in the upper and eastern parts of the LMB during **10-14 September 2024**.
- For **10-14 September**, water levels at all stations are expected to increase from Chiang Saen to Kompong Cham stations. The downstream stations are likely stable. However, it is not expected have any stations reaching alarm and flood levels.
- It is expected that water levels from Luang Prabang to Thakhek stations and from Stung Treng to Kampong Cham stations are staying above their Long-Term Averages (LTAs).

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6.3 Flash Flood Information

With the predicted rainfall for the coming week, flash floods might be detected in some areas in the LMB. 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 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) for the seasonal outlook of rainfall.

Figure 13 below shows the monthly forecasts of combined drought indicator from September to November 2024 over the LMB area.

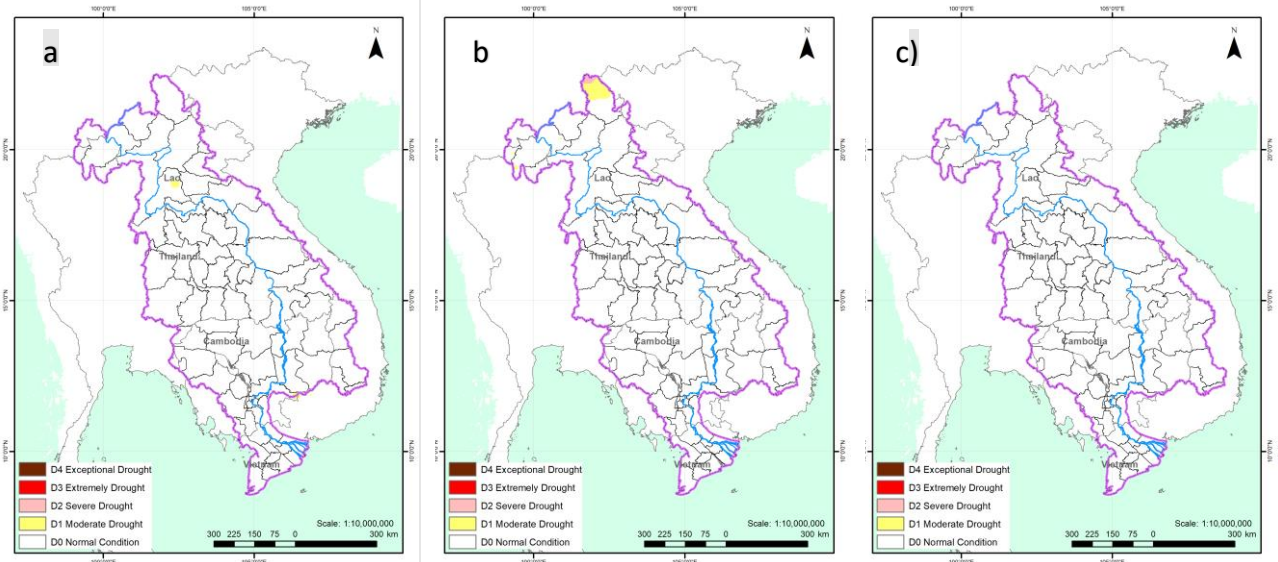


Figure 14. Monthly forecasts of combined drought indicator for a) September, b) October and c) November 2024.

Figure 14 illustrates the monthly drought forecast for the upcoming three months using the Combined Drought Indicator (CDI). The forecast indicates that no significant drought conditions are expected across the entire LMB during this period. However, in October 2024, the upper part of the LMB, including Phongsaly province, is anticipated to experience moderate to severe drought conditions.

7 Summary and Possible Implications

7.1. Rainfall and its forecast

In the period of 03 – 09 September 2024, light to very heavy rainfall has been observed over the LMB. Especially, heavy to very heavy rain occurred in some areas in Chiang Saen, Chiang Saen, Vang Vieng, Moung Namtha, Phongsaly, Xiengkhouang, Paksane, Thakhek, Ban Tha Kok Daeng.

From 10 – 16 September 2024, moderate to heavy rainfall is expected to occur in the LMB. Moreover, isolated heavy rainfall is expected to occur in the upper and eastern parts of the LMB during 11-13 September 2024.

7.2. Water level and its forecast

At 22 key monitoring stations along the Mekong mainstream from 03 – 09 September 2024, the water levels at other stations are in normal conditions, which do not reach alarm and flood levels. The total accumulated volume of the reverse flow to Tonle Sap Lake remains 18.17 Km³.

In the period of 10 – 14 September 2024, water levels at upstream stations along Mekong mainstream from are likely expected to rise from Chiang Saen to Kampong Cham. From Phnom Penh Port station downward, the water levels are expected to be stable. The water levels at all stations are expected to be in normal conditions, which do not reach alarm and flood levels.

7.3. Flash flood and its trends

Due to heavy rain, flash flood event occurred in Luang Namtha province, Lao PDR on 09 September.

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.

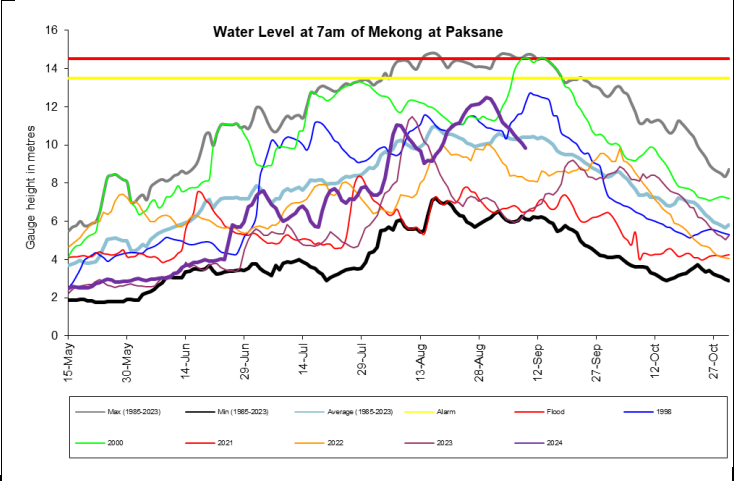
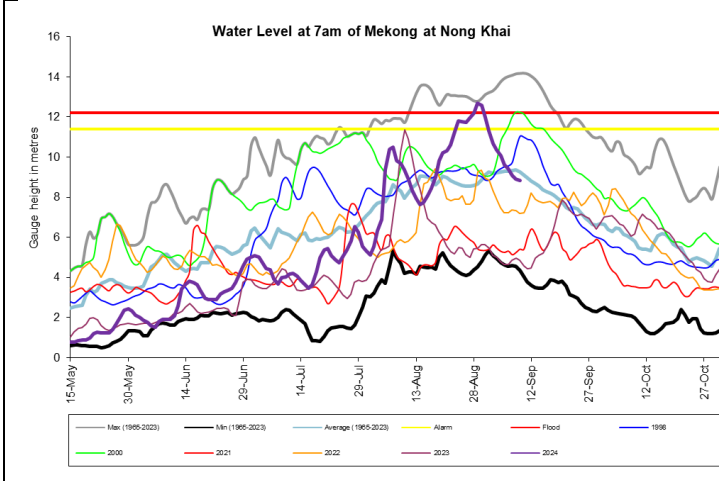
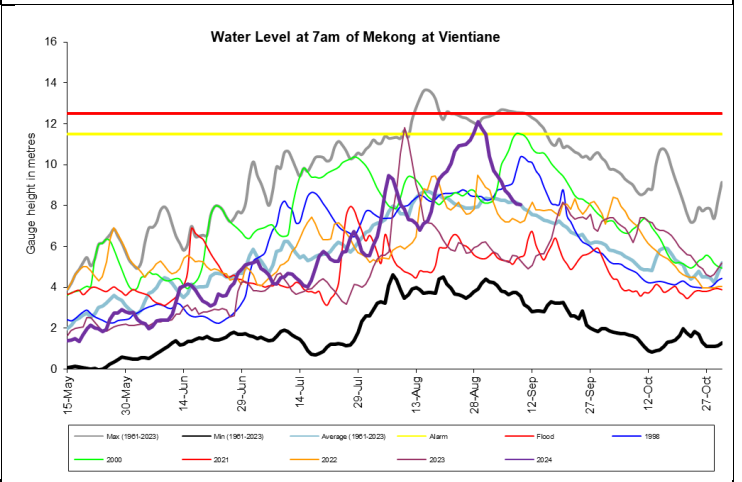
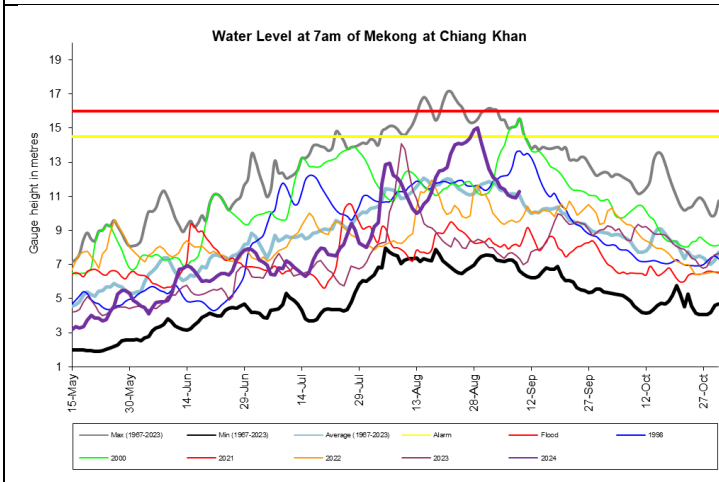
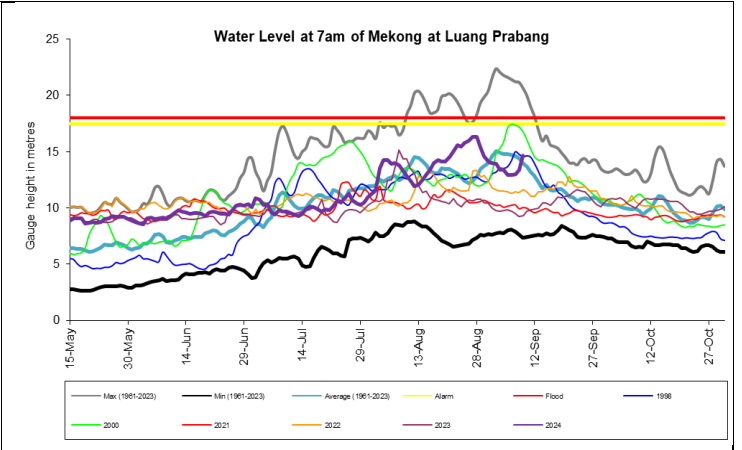
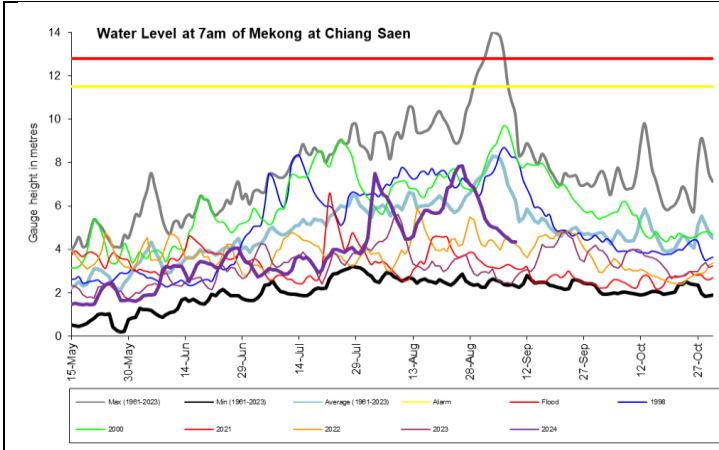
7.4. Drought condition and its forecast

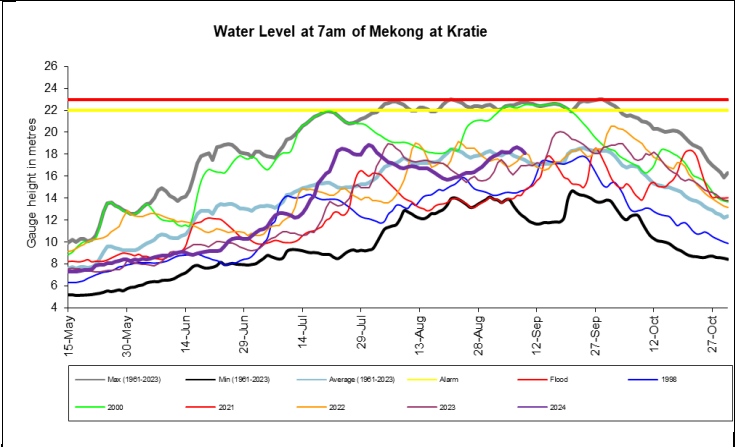
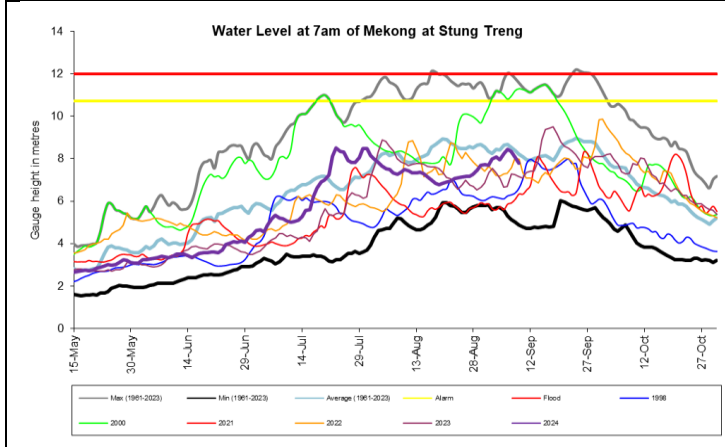
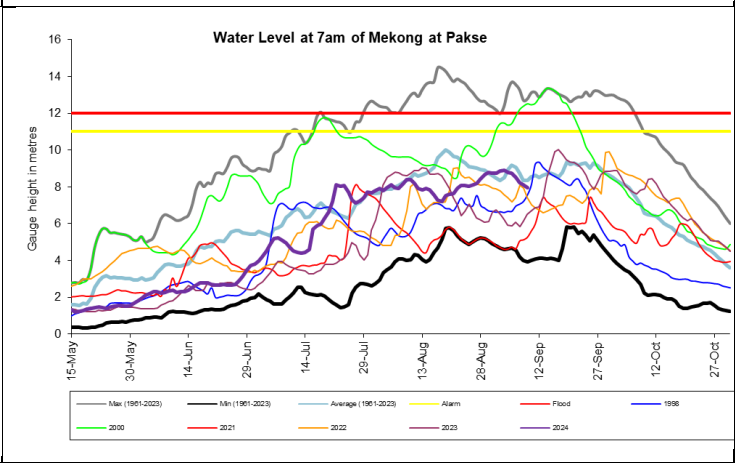
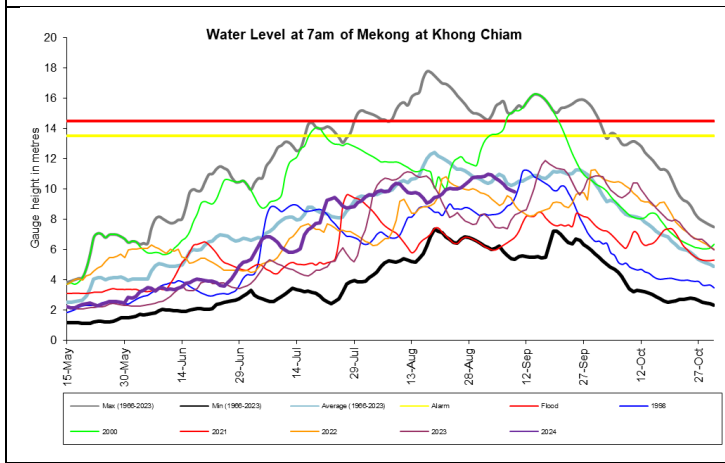
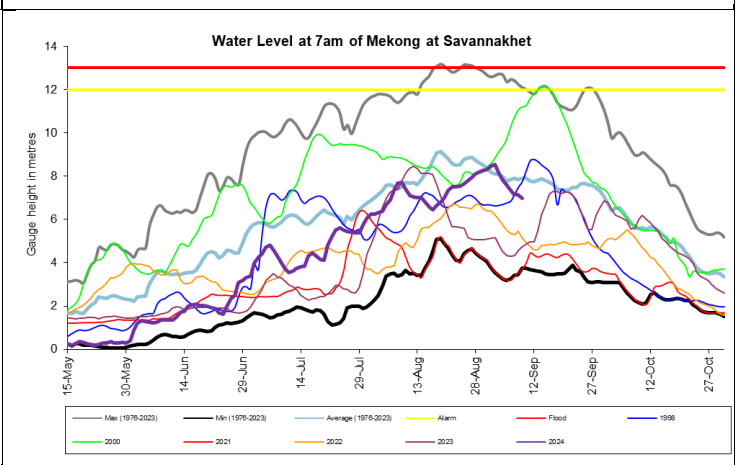
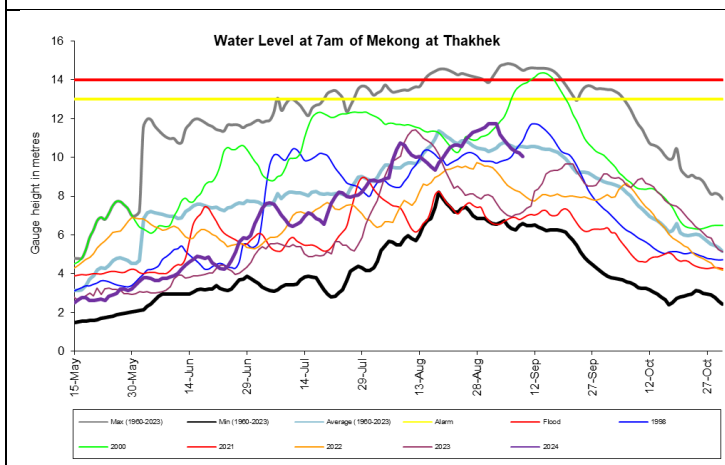
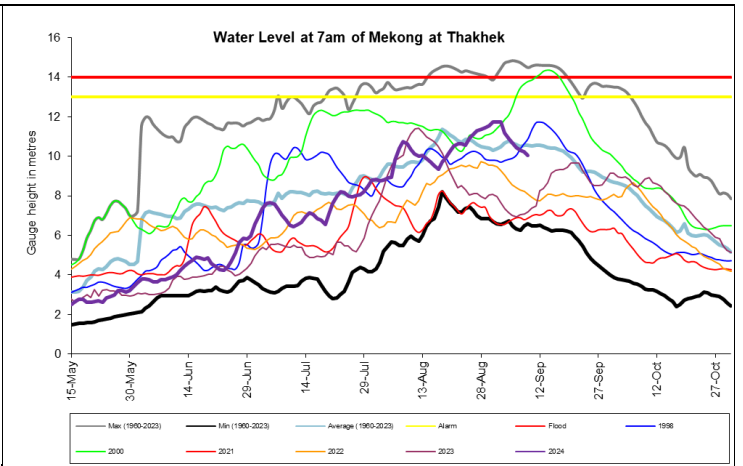
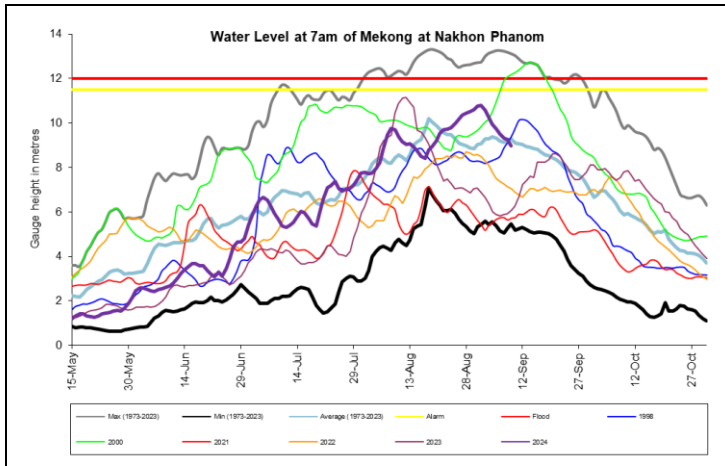
From 03 - 09 September 2024, the LMB experienced moderate and severe droughts over the southern part of Lao PDR and the Eastern part of Cambodia.

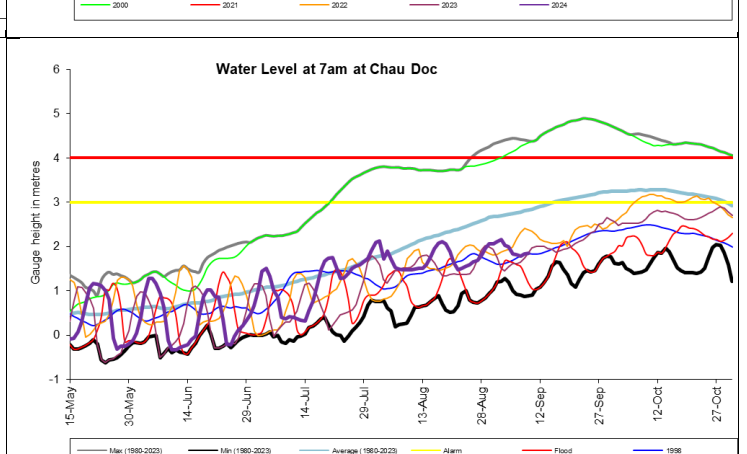
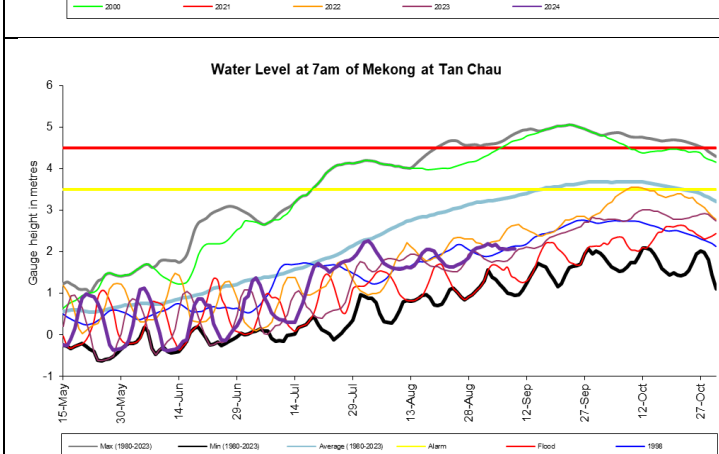
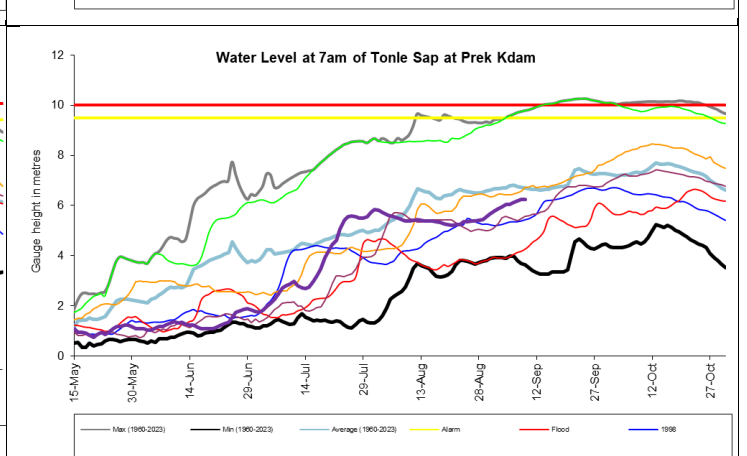
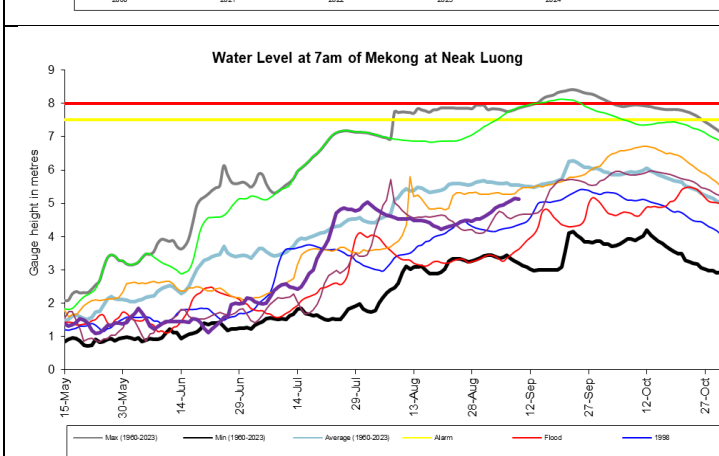
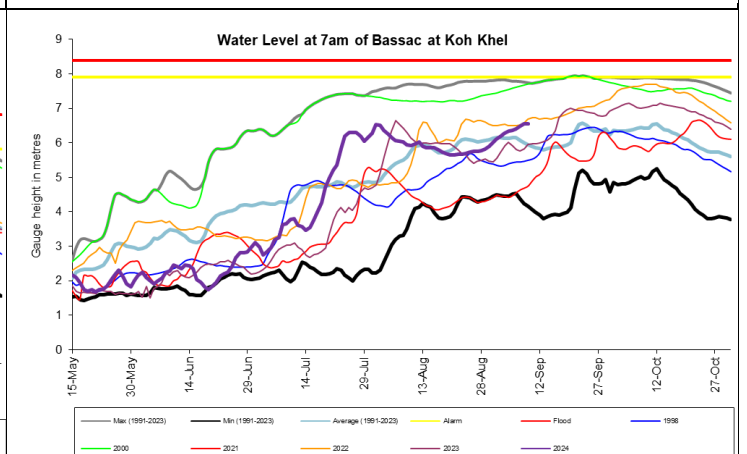
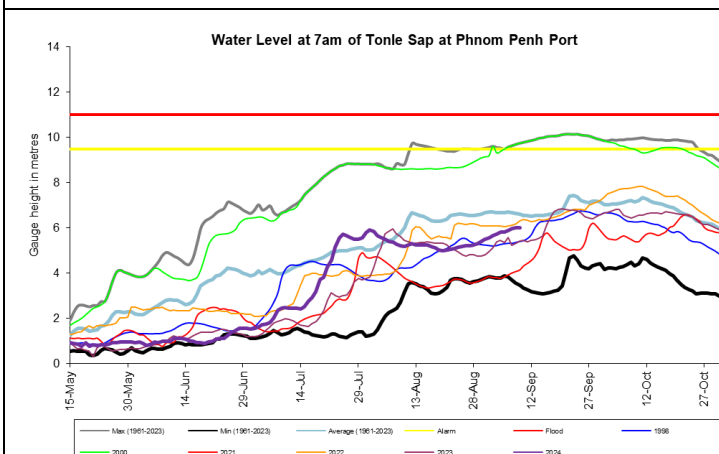
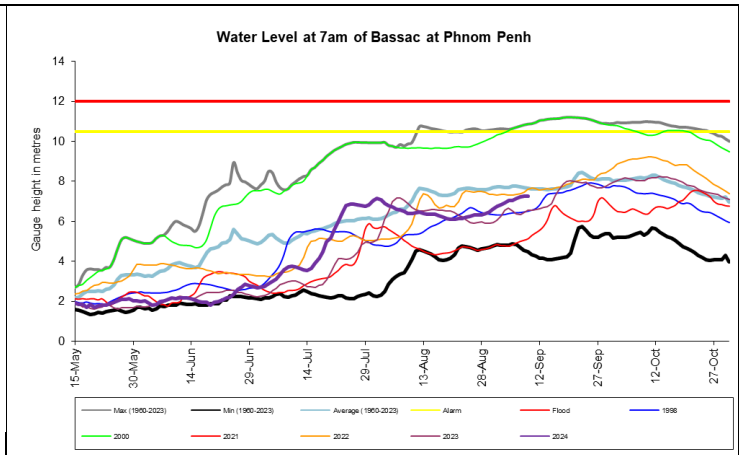
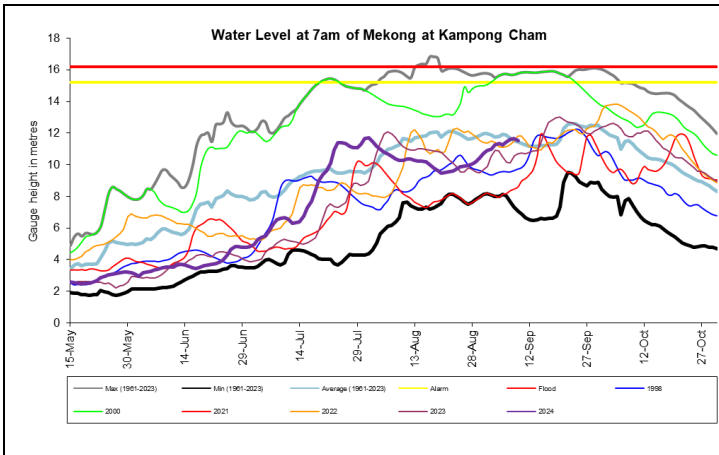
From 10 - 16 September 2024, the LMB is likely at normal conditions. No drought is forecasted for the whole region.

From September to October 2024, the forecast indicates that no significant drought conditions are expected across the entire LMB during this period. However, in October 2024, the upper part of the LMB, including Phongsaly province, is anticipated to experience moderate to severe drought conditions.

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
03-09-2024	536.66	5.01	13.42	11.95	9.46	10.34	11.21	10.25	11.17	9.74	8.12	10.96	8.90	8.08	18.20	11.24	6.94	5.73	6.27	4.85	5.94	2.13	2.02
04-09-2024	536.49	4.98	13.38	11.55	9.15	10.07	10.99	9.95	10.89	9.40	7.81	10.72	8.79	7.94	18.17	11.33	7.05	5.82	6.34	4.93	6.04	2.17	2.00
05-09-2024	536.22	4.80	12.96	11.41	8.74	9.63	10.82	9.73	10.67	9.19	7.60	10.58	8.73	8.24	18.13	11.24	7.05	5.82	6.36	4.96	6.05	2.07	1.83
06-09-2024	536.30	4.63	12.92	11.06	8.58	9.45	10.54	9.50	10.46	8.96	7.35	10.34	8.50	8.45	18.49	11.42	7.13	5.89	6.41	5.01	6.11	2.06	1.82
07-09-2024	535.88	4.52	13.00	10.96	8.25	9.08	10.28	9.33	10.30	8.76	7.16	10.07	8.22	8.34	18.65	11.62	7.22	5.97	6.49	5.08	6.19	2.05	1.79
08-09-2024	535.91	4.34	13.38	10.91	8.09	8.90	10.08	9.26	10.23	8.74	7.16	9.92	8.10	8.06	18.46	11.65	7.25	6.02	6.56	5.14	6.25	2.07	1.83
09-09-2024	535.94	4.36	14.66	11.28	8.05	8.83	9.85	8.96	10.03	8.58	6.99	9.84	7.96	7.77	18.08	11.50	7.25	6.00	6.56	5.12	6.24	2.06	1.84
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

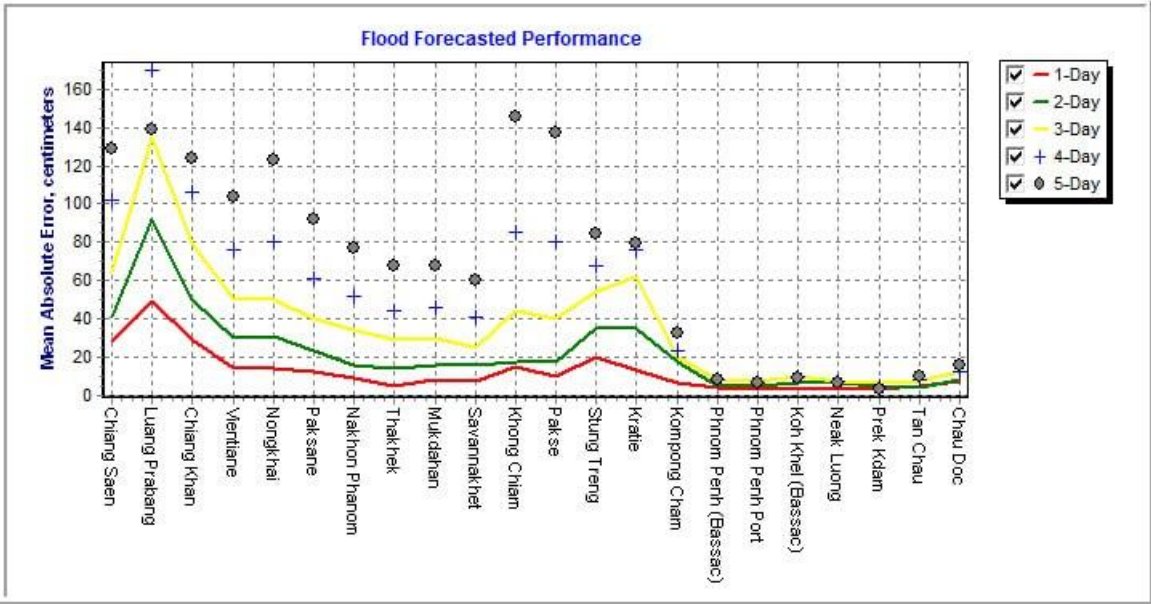
Table A2: Weekly observed rainfall

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
03-09-2024	0	42.5	0	26.6	54.4	78.2	0	0	0	0	7.4	12.1	0	5	0	0	0	0	0	0.5	0	18.7	20
04-09-2024	5.5	0	0	3.3	16.2	50.6	21.1	33.8	11.8	54.3	43.6	52.6	26.4	1	0	0	2.4	0	27	0.8	0	2.7	15
05-09-2024	0.5	0	0.8	2.6	4.8	3.7	24	0	0	0	0.4	15.3	29.2	57	12.5	0	0	0	15	4.6	0	11.7	4
06-09-2024	6	5.3	0	26.9	0	0	0	2.3	5.8	0	0	11.1	0	4	3.4	8.5	0	0	0	0	0	0	5
07-09-2024	0	0	0	0	0	0	24.8	57.8	53.2	34.2	18.4	3	19.6	2.5	13	12	0	0	0	0	8.2	0	0
08-09-2024	1	8.3	11.8	0	0	0	1	11	14.3	4.5	3.6	0	1.8	7	2	0	0	0	0	0	0	0.9	0.2
09-09-2024	2	26.1	110.8	0	0	0	0	0	0	0	0	0	3.6	8	28.6	0	0	0	0	0	0	0.7	4.3
Sum	15.0	82.2	123.4	59.4	75.4	132.5	70.9	104.9	85.1	93.0	73.4	94.1	80.6	84.5	59.5	20.5	2.4	0.0	42.0	5.9	8.2	34.7	48.5

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 03 to 09 September 2024.



The forecasting values from 03 to 09 September 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 forecasting stations.

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.



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