Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin

17 – 23 September 2024

Prepared by
The Regional Flood and Drought Management Centre
24 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 17 – 23 September 2024, light to very heavy rainfall has been observed over the LMB. Especially, heavy to very heavy rain occurred in some areas in Nong Khai, Khong Chiam, Nakhon Phanom, Savannakhet, Mukdahan, Mahaxai, Paksane, Nakhon Phanom, Thakhek, Kratie.
- From 24 – 30 September 2024, Light to moderate rain is expected over the Lower Mekong Basin. However, isolated heavy rain may occur in the central part of the LMB include the central part of Lao PDR on 24 - 25 September.

Water level monitoring and forecast

- At 22 key monitoring stations along the Mekong mainstream from 17 – 23 September 2024, water levels upper stretch of the LMB have decreased from Chiang Saen to Savannakhet stations, while it has been increasing from Khong Chiam downward. The total accumulated volume of the reverse flow to Tonle Sap Lake remains 21.64 Km3.
- In the period of 24 – 28 September 2024, water levels at upstream stations along Mekong mainstream from are likely expected to drop and return to normal conditions. From Khong chiam downward, water levels are expected to significantly rise, resulting in reaching alarm and flood levels for Khong Chiam and Pakse station. At Stung Treng and Kratie stations, water levels are expected to be approaching the alarm levels in the next five days.

Drought condition and forecast

- From 17 - 23 September 2024, the LMB is experiencing normal to severely wet conditions. However, some small areas in Cambodia are experiencing moderate drought include: Mondulkiri, Battambang, and Takeo. The observed drought was caused primarily by meteorological indicator.
- From 24 - 30 September: the LMB is likely at normal conditions. No drought is forecasted for the whole region, except for some small areas in Battambang, Kampong Speu, and Takeo (Cambodia).

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 **17** – **23 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 last week, the tropical depression strengthened into the tropical storm, namely Soulik. This tropical storm made landfall in areas from Quang Tri to Quang Nam provinces (Viet Nam) on 19 September, then weakened into the tropical depression cover Khammouane province (Lao PDR) on 20 September. Heavy to very heavy rainfall occurred in some areas in the upper part and central part of Lao PDR as well as in the Northeastern part of Thailand.

Figure 1: The tracking of Soulik storm from 18 to 20 September.

Next week from 24 – 30 September 2024, the rather strong monsoon through lies across the central part of the LMB into the low-pressure cell over Hainan, China while the moderate southwest monsoon prevails over the lower part of the LMB. Light to moderate rain is expected over the Lower Mekong Basin. However, isolated heavy rain may occur in the central part of the LMB include the central part of Lao PDR on 24 - 25 September.

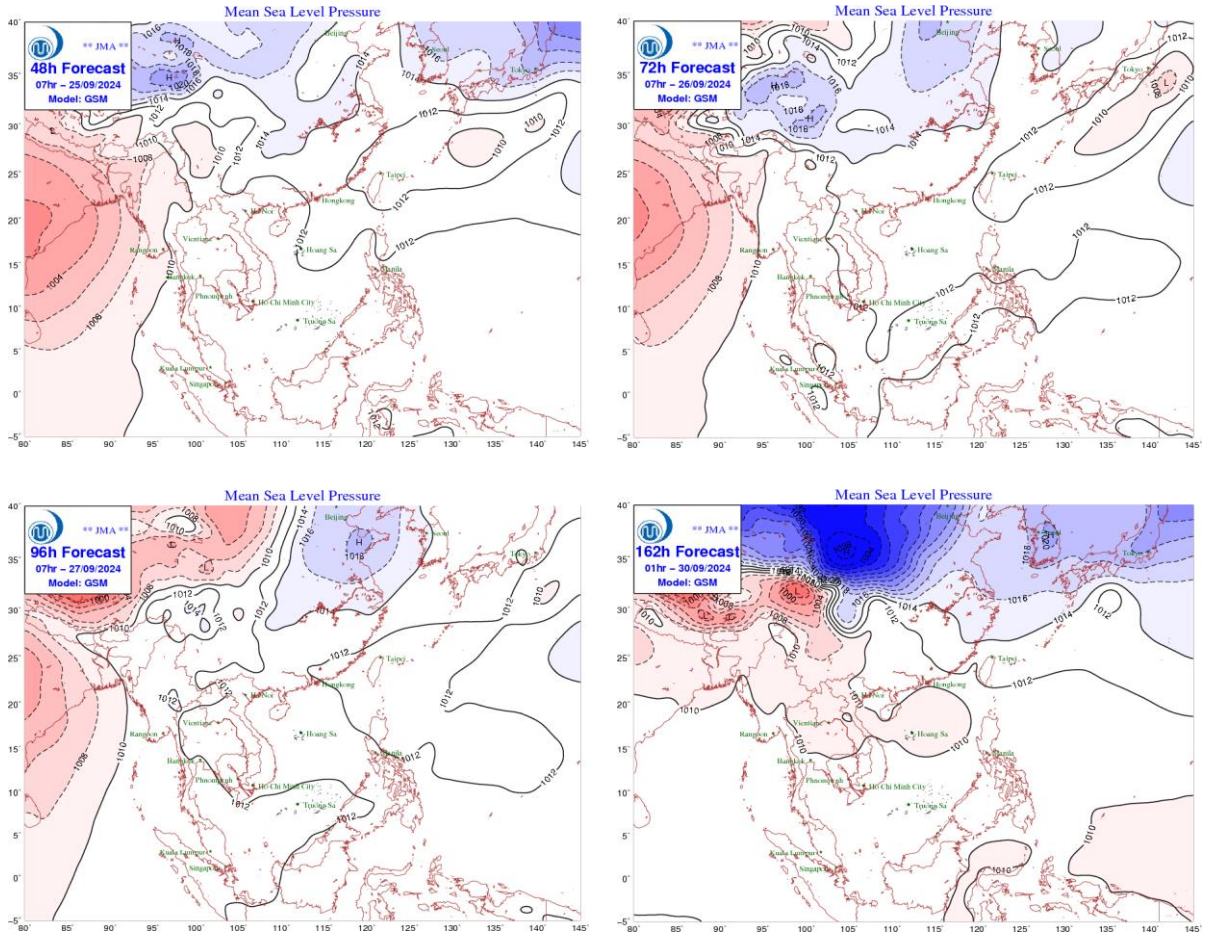


Figure 2: Weather conditions over the LMB from 24 to 30 September

According to the ASEAN Specialised Meteorological Centre (ASMC, http://asmc.asean.org/home/), the subseasonal weather outlook (16 – 29 September 2024) indicates that wetter conditions is expected for the entire LMB, while warmer conditions are predicted at the lower to central parts of the LMB. **Figure 2** shows the outlook of weather condition from

– 29 September 2024 in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

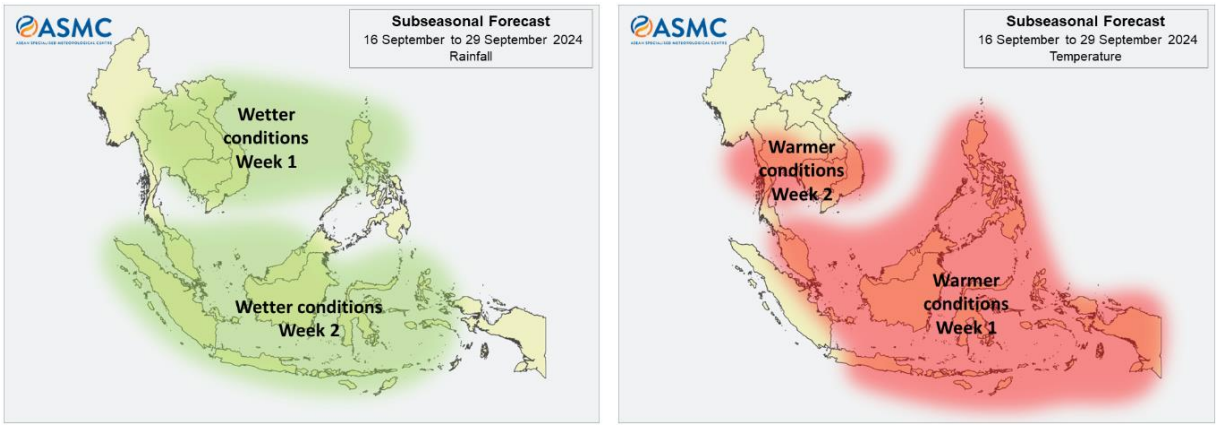


Figure 3: Outlook of wet and dry conditions over the Asian countries by ASMC.

Based on the tropical storm risk (TS) (https://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/RSMC_HP.htm), there is no active NW pacific system as of 23 September 2024 as displayed in **Figure 3.** This tropical depression may affect central LMB.

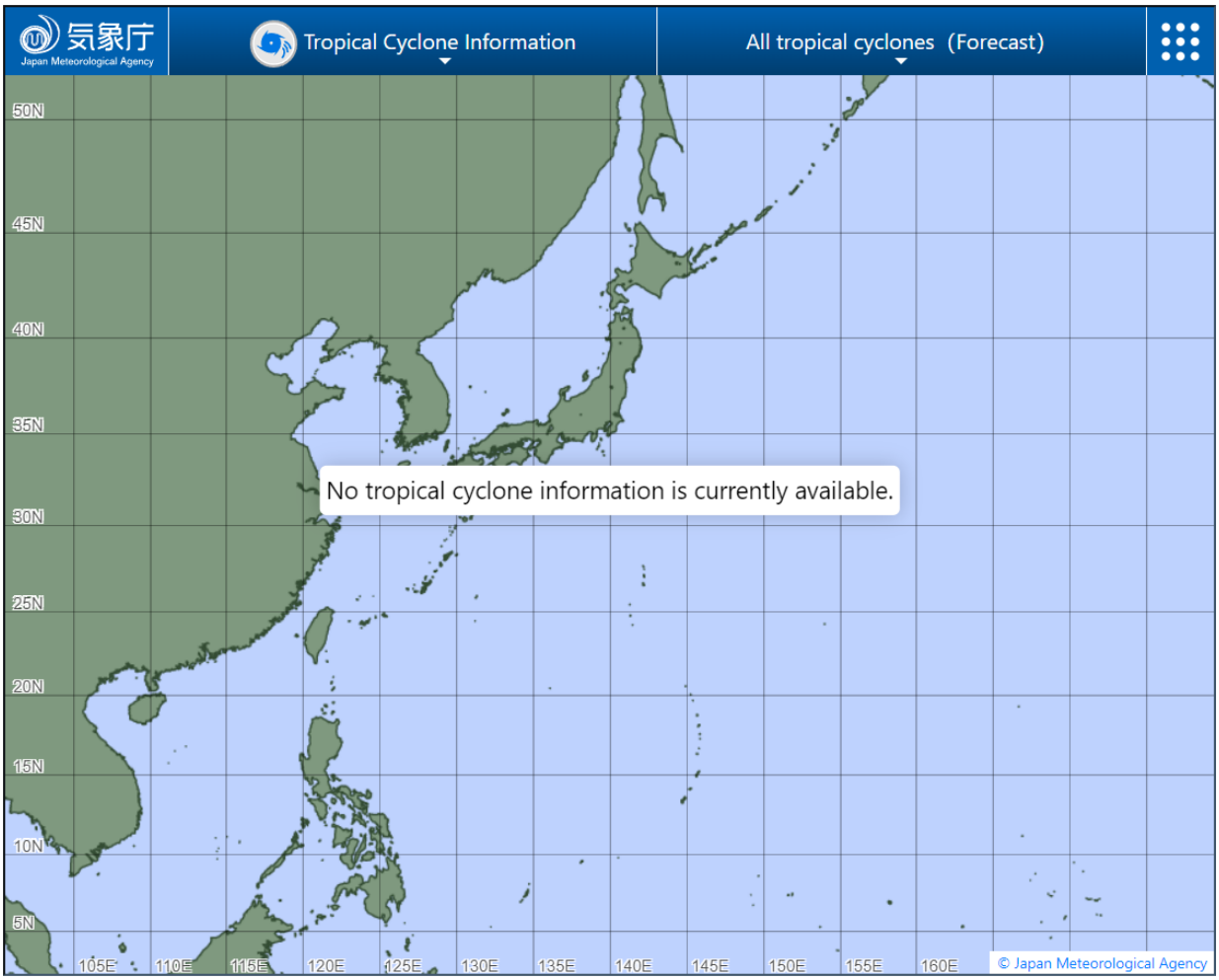


Figure 4: One tropical storm risk observed on 23 September 2024

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 17 - 23 September 2024 (**Figure 4**) light to very heavy rainfall has been observed over the LMB. Especially, heavy to very heavy rain occurred in some areas in Nong Khai, Khong Chiam, Nakhon Phanom, Savannakhet, Mukdahan, Mahaxai, Paksane, Nakhon Phanom, Thakhek, Kratie.

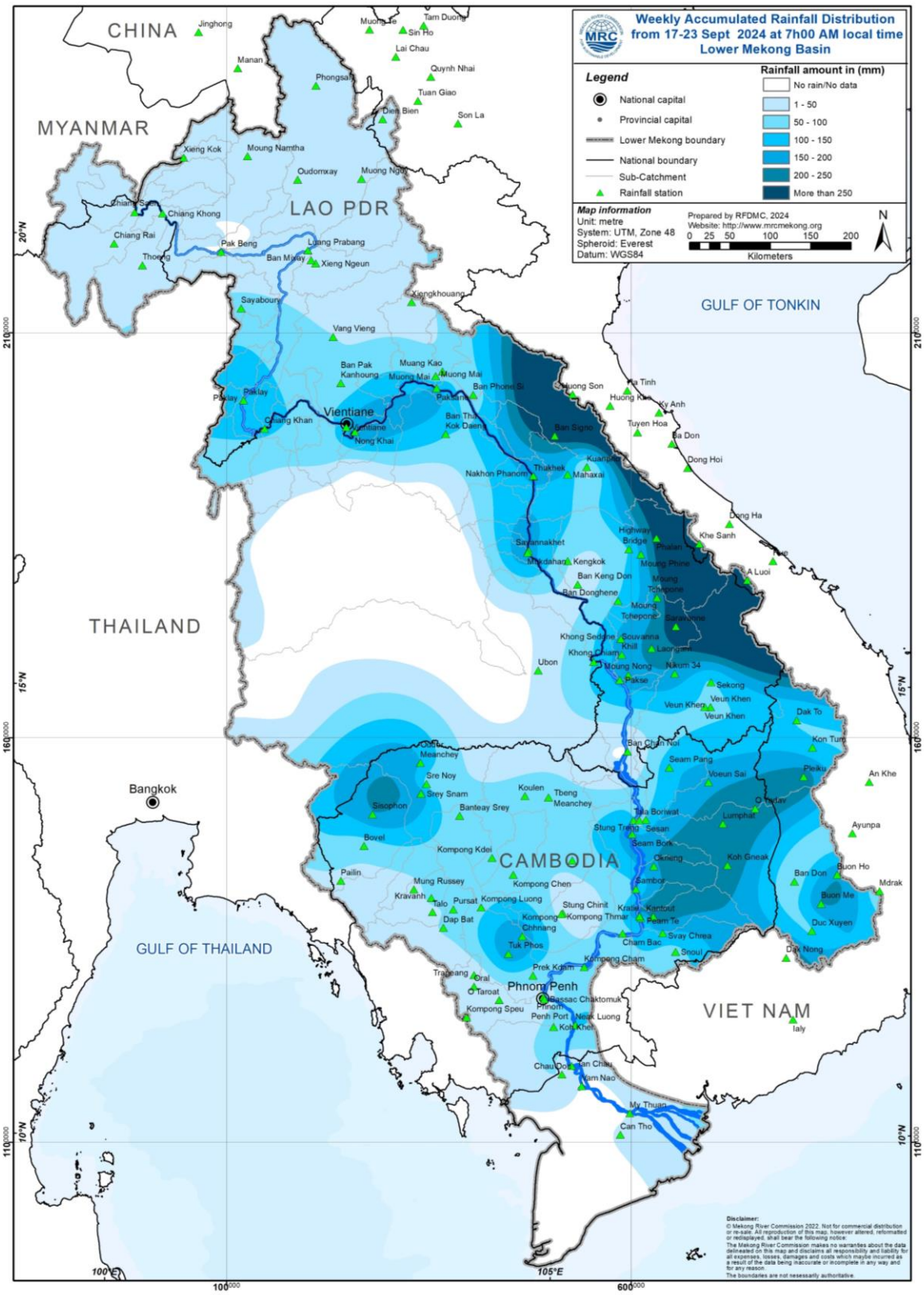


Figure 5: Weekly rainfall distribution over the LMB during 17 – 23 September 2024

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 17 – 23 September 2024, the observed water level (WL) at Jinghong hydrological station[1], was almost constant and ranges between 535.32 m and 535.97 m, which are corresponding to the outflow between 885.00 m^3/s to 2,130.00 m^3/s (recorded on 7:00 am), respectively (**Figure 6**). The water level in Chiang Saen station significantly decreased approximately from 6.51 m to 4.11 m. At the same period, the water level in Luang Prabang station also decreased with an approximate value of 3.91 m from 16.57 m to 12.66 m as compared to the previous week. Water levels at Chiang Khan, Vientiane and Nongkhai have decreased from 15.30 m to 10.86 m, 12.72 m to 8.66 m, and 13.58 m to 9.55 m, respectively. Moving downward from Paksane to Savannakhet stations, water levels have also been decreasing from 13.38 m to 11.19 m, 11.65 m to 11.0 m, 12.57 m to 11.97 m, 10.66 m to 11.09 m, and 9.42 m to 9.49 m, respectively.

From Khong Chiam to Kratie station, water levels have increased from 12.30 m to 13.95 m, 10.08 m to 11.63 m, 9.06 m to 10.00 m, and 19.34 m to 21.18 m, respectively. The stations located in the floodplain at Kompong Cham, Phnom Penh Bassac, Phnom Penh Port, Koh Khel Neak Luong and Preak Kdam stations, water levels have also increased from 11.86 m to 13.76 m, 7.4 m to 8.71 m, 6.15 m to 7.32 m, 6.55 m to 7.47 m, 5.14 m to 6.20 m, and 6.38 m to 7.41 m, respectively.

From to the previous week, the water levels from 17 to 23 September 2024 at Viet Nam's Tan Chau and Chau Doc, water levels have increase from 2.52 m to 2.90 m and from 2.41 m to 2.51 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.

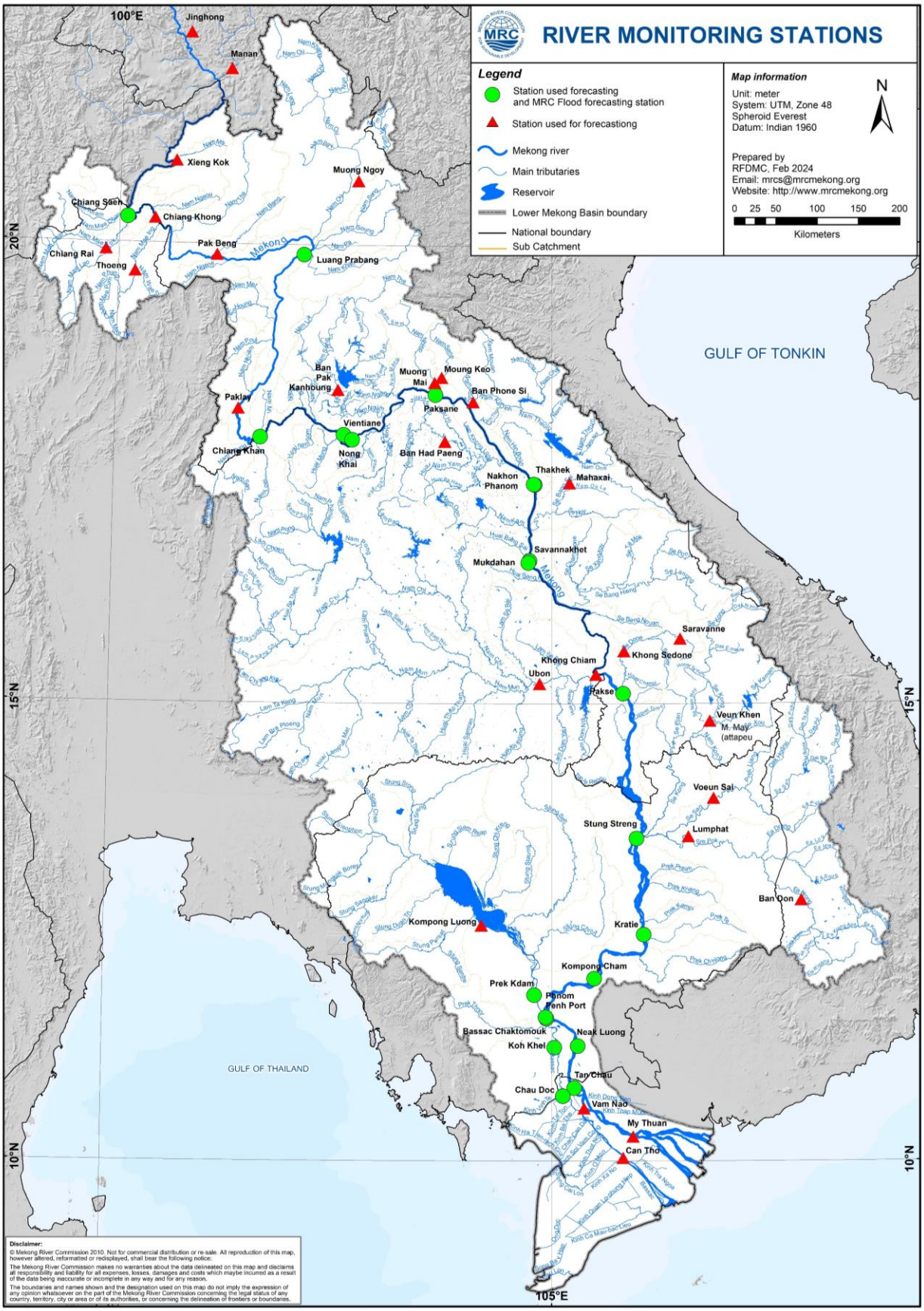


Figure 6: The key stations along LMB for river flood forecasting

The water levels in key monitoring stations on 23 September, water levels at upper stretch of LMB have reached to normal conditions. However, it has increased at downstream stations, resulting in reaching Alarm levels at Khong Chiam and Pakse stations. Moreover, all stations with available PMFM (Article 6C) thresholds are in normal conditions except for Khong Chiam. 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**.

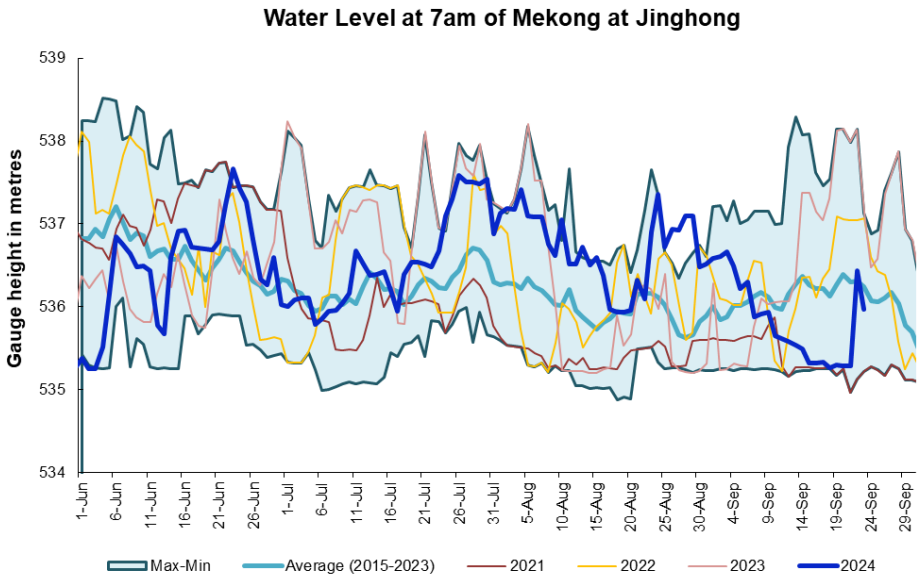


Figure 7. Water level at the Jinghong hydrological station up to 23 September 2024.

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:

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

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 accumulated volume of 21.64 Km^3. 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 23 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 23 September 2024, the volume of the lake is approximately 66.87% of its LTA in September.

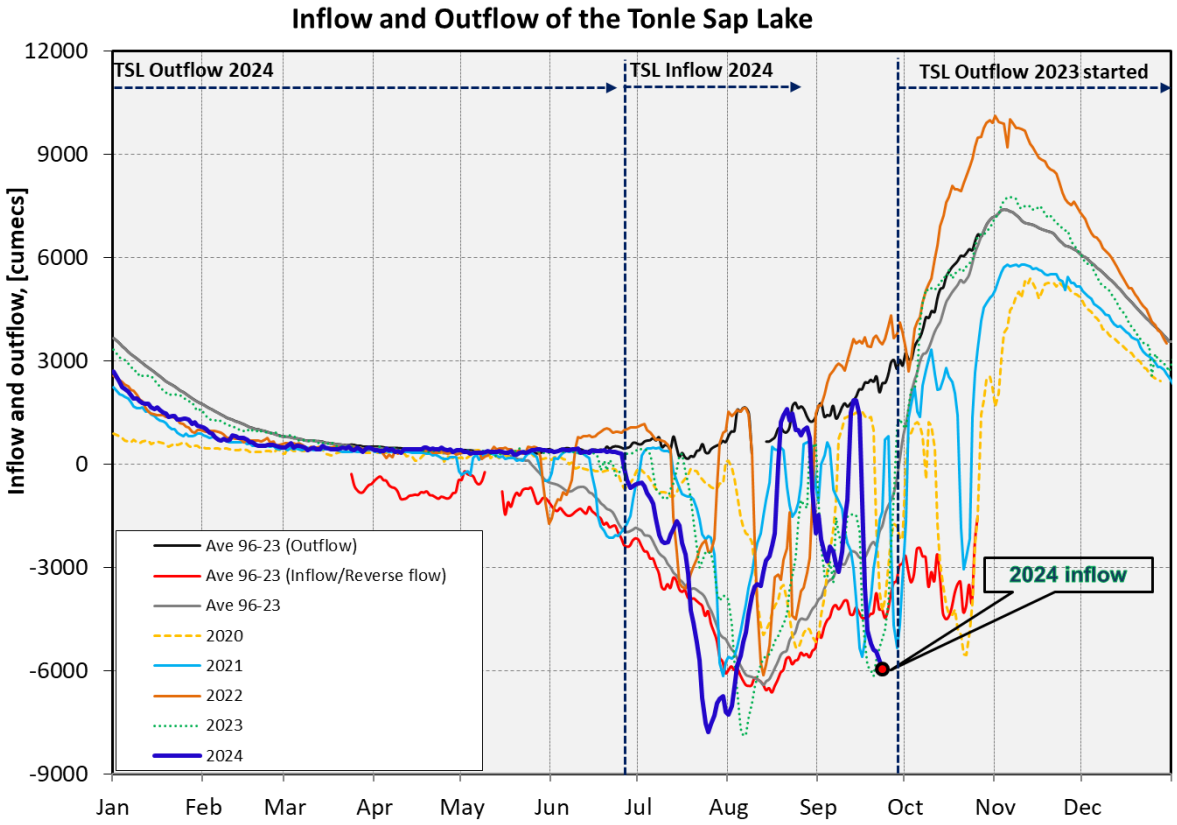


Figure 8: Seasonal change of inflows and outflows of Tonle Sap Lake.

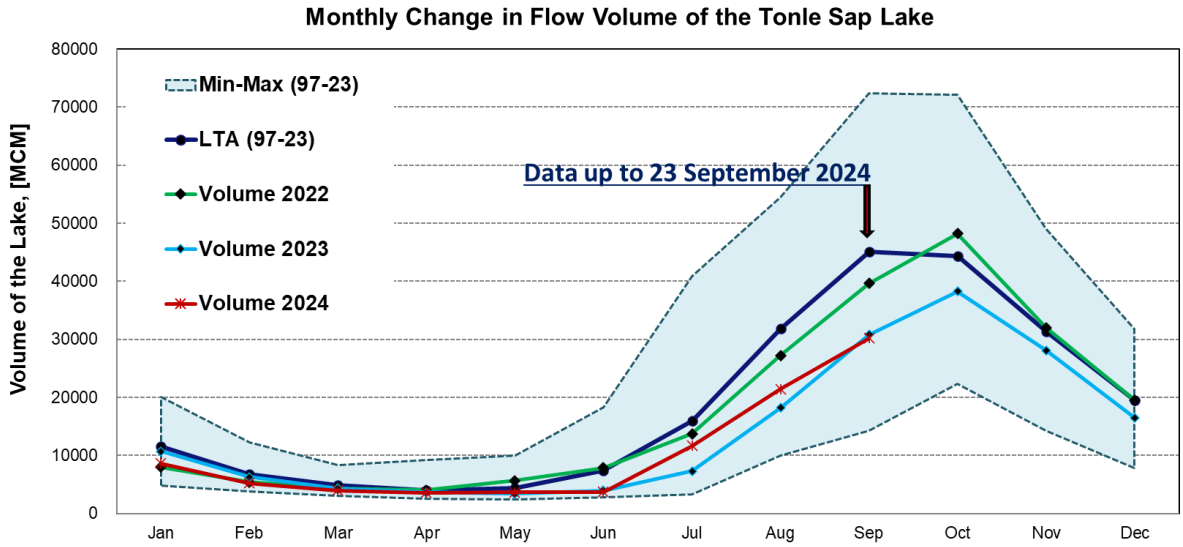


Figure 9. The seasonal change in monthly volume of Tonle Sap Lake.

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	30151.56	66.87
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 untill 23 Sept 2024.

4. Flash Flood in the Lower Mekong Basin

During the weekly monitoring period from 17 - 23 September 2024, the LMB received light to very heavy rain in some areas over 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 and Lao PDR on 20 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
Champasak	Phonthong	Moderate	Khammuane	Thakhek	High	Khammuane	Thakhek	High
Khammuane	Thakhek	High	Khammuane	Xaybouath	Moderate	Khammuane	Xaybouath	High
Khammuane	Xaybouath	High	Saravane	Lakhoneph	Moderate	Saravane	Lakhoneph	Moderate
Saravane	Lakhoneph	Moderate	Saravane	Toomlarn	Moderate	Saravane	Toomlarn	Moderate
Saravane	Samuoi	Moderate	Savannakhet	Thapangth	Moderate	Savannakhet	Thapangth	Moderate
Saravane	Toomlarn	Moderate	Savannakhet	Vilabuly	Moderate	Savannakhet	Vilabuly	Moderate

Savannakhet	Thapangth	Moderate	Xiengkhuang	Morkmay	Moderate	Xiengkhuang	Morkmay	Moderate
Savannakhet	Vilabuly	Moderate						
Sekong	Thateng	Moderate						
Xiengkhuang	Morkmay	High						

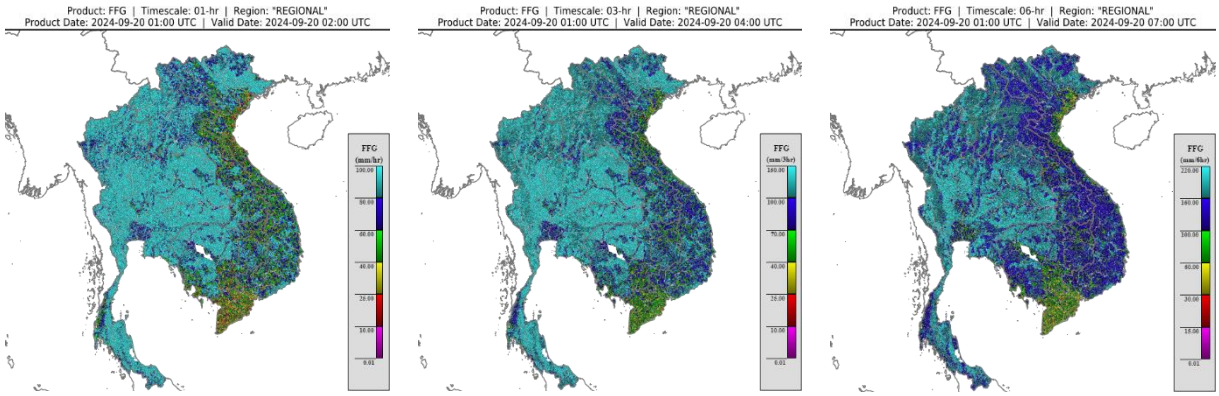


Figure 10. Flash Flood risk for the next 12-hr and 24-hr on 20 September

5. Drought Monitoring in the Lower Mekong Basin

5.2. Weekly drought monitoring from 17 - 23 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 17 - 23 September, the LMB is experiencing the LMB was facing normal to wet conditions. However, some small areas in Cambodia is experiencing moderate drought include: Mondulkiri, Battambang, and Takeo.

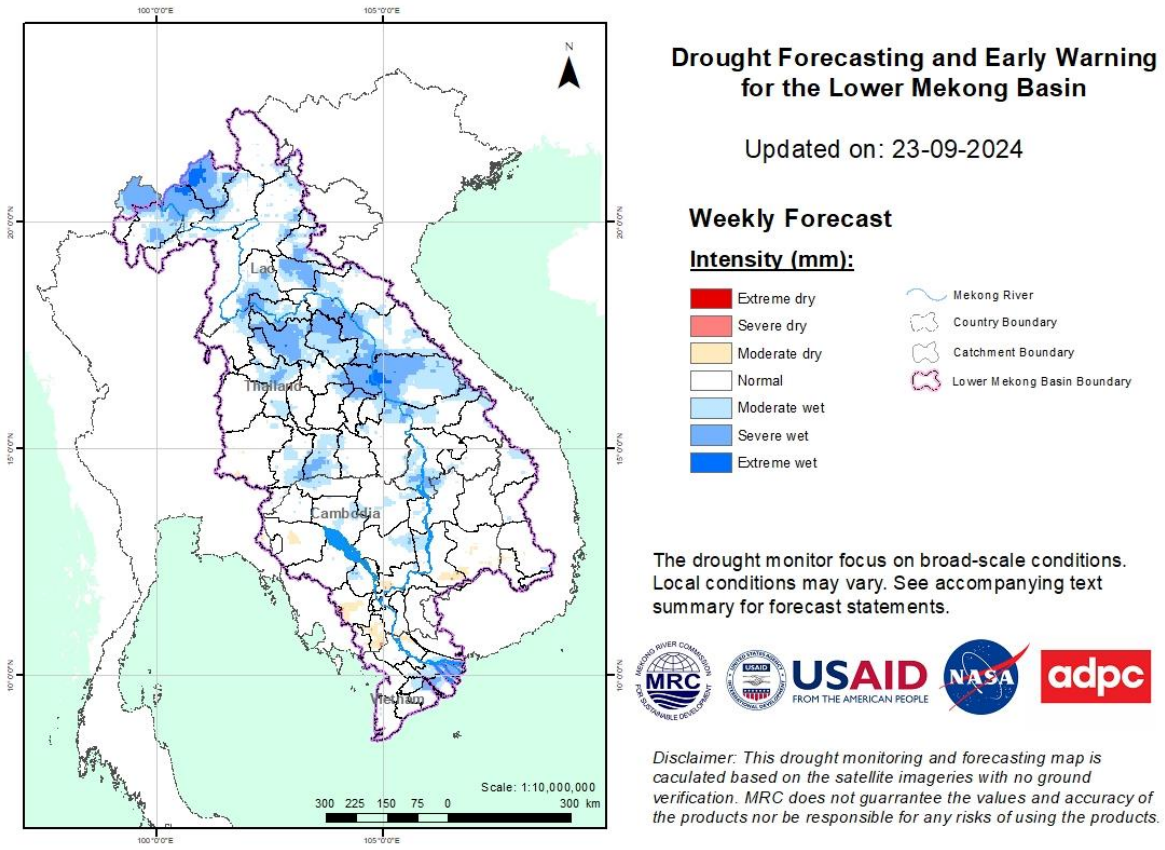


Figure 11: Weekly standardized precipitation index from 17 – 23 September.

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

The LMB was facing a normal conditions during the monitoring week from 17 – 23 September 2024, see **Figure 10**.

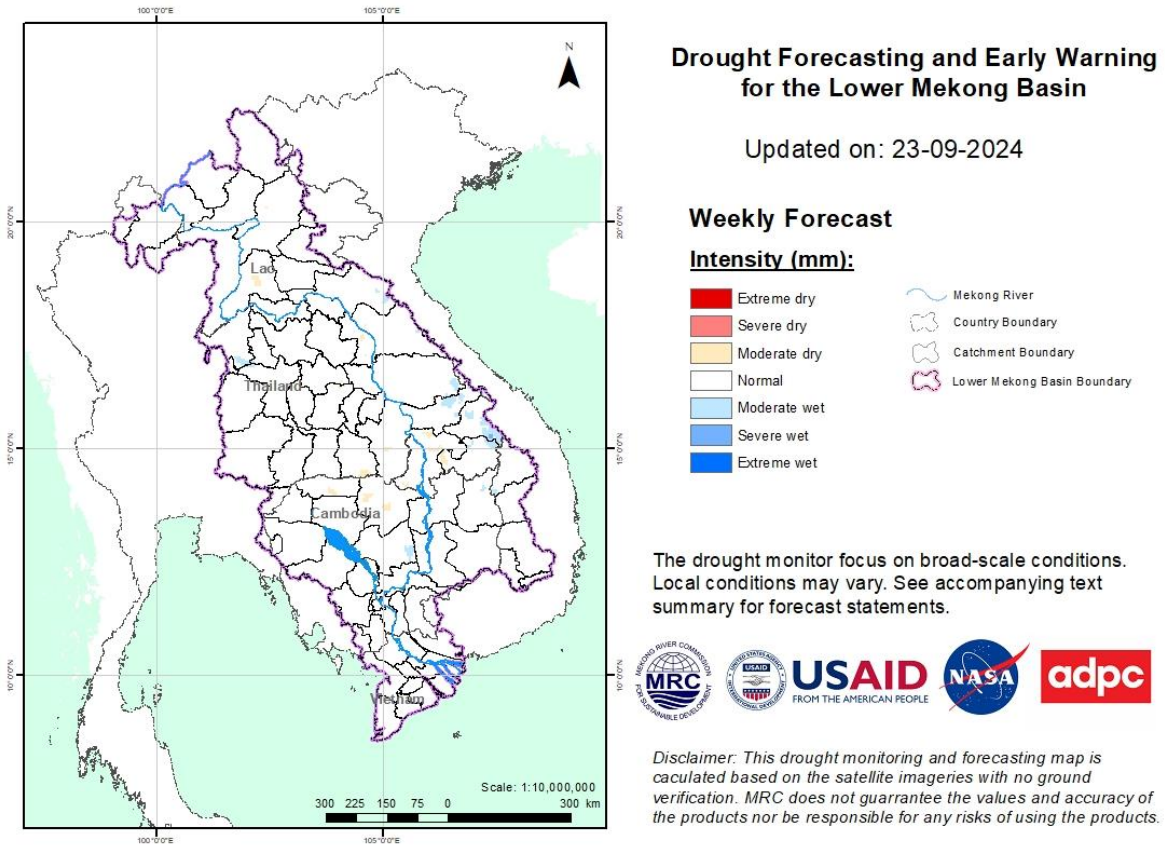


Figure 12: Weekly Index of Soil Water Fraction from 17 – 23 September.

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

The combined drought indicator, **Figure 11**, shows that No drought in most parts of the region. 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	Battamabang					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	Bueng Kan				
4	Cambodia	Pursat					27	Lao PDR	Xiengkhouang					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	Mondulkiri					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					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						Moderate	Severe				
															Extreme	Exceptional				

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

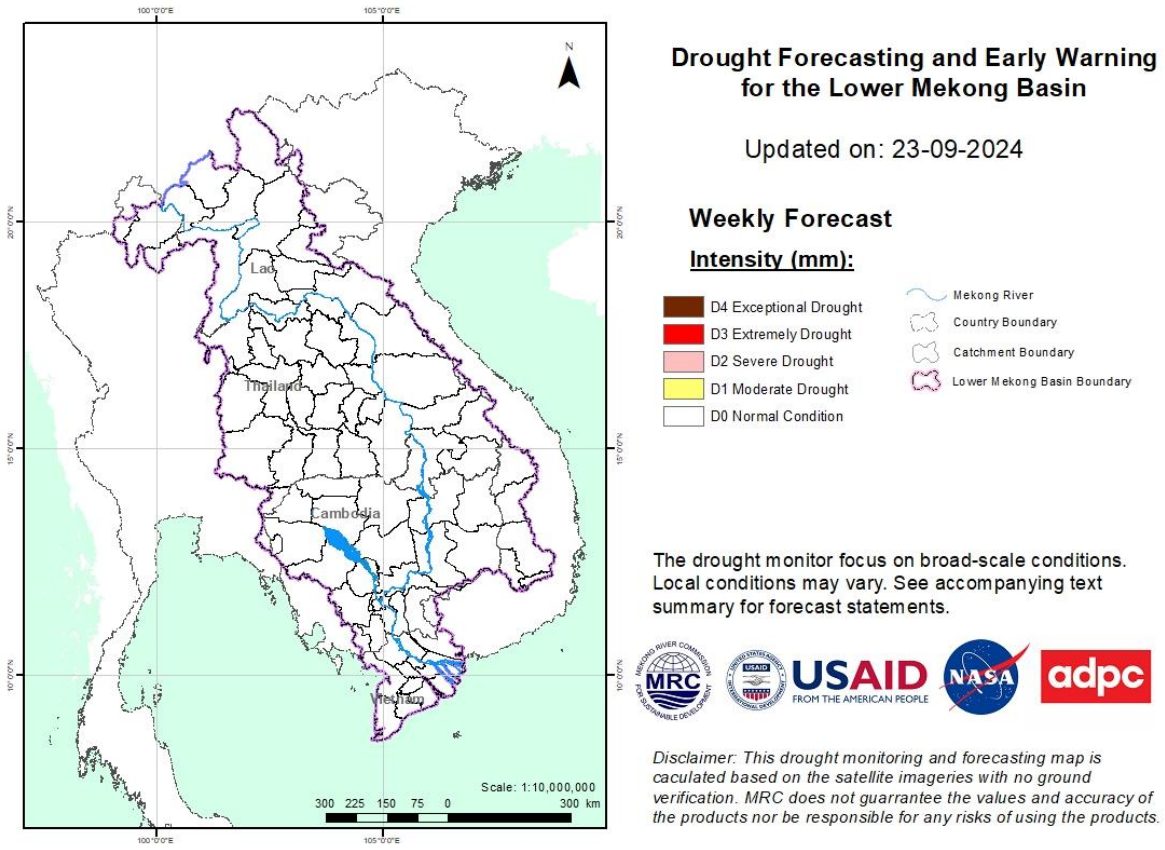


Figure 13: Weekly Combined Drought Index from 17 - 23 September.

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 24 – 28 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 Light to moderate rain is expected over the Lower Mekong Basin. However, isolated heavy rain may occur in the central part of the LMB include the central part of Lao PDR on 24 - 25 September.

Figure 14: Accumulated rainfall forecast from CHIRPS-GEFS (24 – 28 September 2024)

6.2 Water level forecast

The five-day forecast is carried out from 24 to 28 September 2024 for 22 forecasting stations along the Mekong mainstream. Overall, water levels at upper stretch of the LMB from Chiang to Thakhek stations are expected to decrease, while from Mudahan downward, water levels are expected to increase significantly. Khong Chiam is expected to stay at Alarm level, while Pakse is expected to reach flood level within the next five days. Moreover, Stung Treng and Kratie stations are expected to be approaching the Alarm levels with minimum distance to alarm level of approximately 0.2 m.

At Chiang Khan, Vientiane, Nongkhai, Paksane, Nakhon Phanom and Khong Chiam stations, water levels are expected to drop with approximated value of -0.30 m, -0.48 m, -0.63 m, -0.97 m, -0.82 m, -0.81 m, -0.91 m, and -0.24 m, respectively. Moreover, Pakse, Stung Treng, Kratie, Kompong Cham, Phnom Penh (Bassac), Phnom Penh Port, Koh Khel, Neak Luong, and Prek Kdam, water levels are expected to rise approximately, 0.08 m, 0.35 m, 0.55 m, 0.67 m, 0.58 m, 0.58 m, 0.22 m, 0.31 m, and 0.50 m respectively.

For the Tan Chau station on the Mekong River and Chau Doc station on the Bassac River, water levels are also expected to be rise as well. At Tan Chau, water level will rise approximately 0.27 m, while at Chau Doc 0.23 m.

The weekly River Monitoring Bulletin and forecasting issued on 23 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

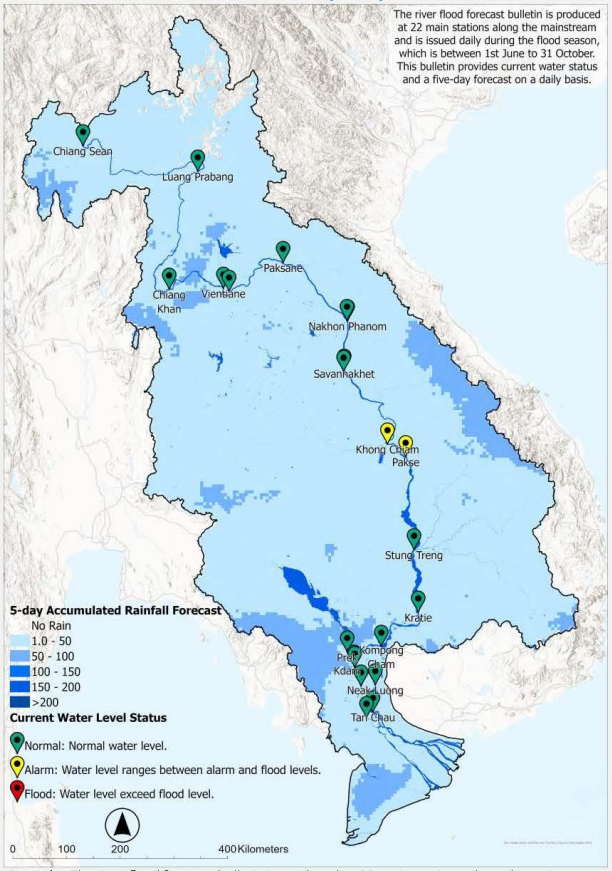
Table 3. River Monitoring and Forecasting Bulletin

MEKONG RIVER MONITORING AND FORECASTING BULLETIN

Monitoring on 23 September 2024, *7:00 (UTC+7)*

Highlights: *Water levels at **Khong Chiam** and **Pakse** stations are still at ALARM LEVELS. In addition, water levels from **Khong Chiam** downward have been still rising. The **total volume of accumulated reverse flow** to **Tonle Sap Lake** has increased to **21.64 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.*

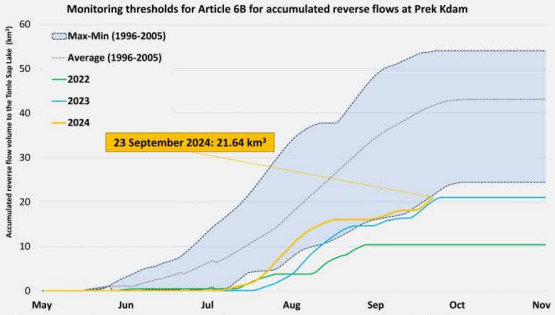
CURRENT WATER LEVEL STATUS

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	**Alarm**	Stable
Pakse	**Alarm**	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 KDAM (PMFM*6B)



Accumulated reverse flow volume at Prek Kdam

Flow volumes on 23 September 2024:	21.64 Km³
Minimum reverse flow volume (1996-2005):	23.848 Km³
Average reverse flow volume (1996-2005):	42.84 Km³
Maximum reverse flow volume (1996-2005):	54.046 Km³

**Procedures for Maintenance of Flows on the Mainstream*

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.

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http://www.mrcmekong.org/
http://ffw.mrcmekong.org/bulletin_wet.php
http://ffw.mrcmekong.org/reportflood.php
https://pmfm.mrcmekong.org/

MEKONG RIVER MONITORING AND FORECASTING BULLETIN

Forecasting from 24 to 28 September 2024 (*updated on 23 September, 7:00 UTC+7*)

Highlights: ***Water level*** *at* ***Pakse*** *station is expected to reach* ***FLOOD LEVEL****. Minimum distance to* ***flood level*** *at* ***Khong Chiam*** *station is expected to be* ***0.34 m****.* ***Stung Treng*** *and* ***Kratie*** *stations are expected to approach* ***ALARM LEVELS*** *with minimum distance to alarm level of* ***0.23 m*** *and* ***0.21 m****.*

Forecasting Station	24 h Observed Rainfall (mm)	Zero gauge above M.S.L (m)	Observed Water Level againt 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)
	22-Sep		22-Sep	23-Sep	24-Sep	25-Sep	26-Sep	27-Sep	28-Sep						
Jinghong	1.0	-	536.44 ↓	535.97	-	-	-	-	-	-	-	-	-	-	-
Chiang Saen	2.2	357.110	4.16	↓ 4.11	→ 4.20	↑ 4.59	↑4.78	↑ 4.92	↑ 5.19	11.50	12.80	↑ 1.08	1.08	6.31	7.61
Luang Prabang	1.2	267.195	12.80	↓ 12.66	→ 12.57	↓ 12.39	↑12.58	↑ 12.95	↑ 13.45	17.50	18.00	↑ 0.79	0.79	4.05	4.55
Chiang Khan	13.7	194.118	11.14	↓ 10.86	↓ 10.66	→ 10.57	→10.47	→ 10.52	→ 10.56	14.50	16.00	↓ -0.30	-0.39	3.85	5.35
Vientiane	10.4	158.040	8.80	↓ 8.66	↓ 8.46	→ 8.38	→8.30	→ 8.25	→ 8.18	11.50	12.50	↓ -0.48	-0.48	3.04	4.04
Nongkhai	13.8	153.648	9.67	↓ 9.55	↓ 9.39	↓ 9.23	→9.19	↓ 9.04	↓ 8.93	11.40	12.20	↓ -0.63	-0.63	2.01	2.81
Paksane	113.6	142.125	11.60	↓ 11.19	↓ 10.79	↓ 10.49	↓10.21	→ 10.22	→ 10.22	13.50	14.50	↓ -0.97	-0.98	2.71	3.71
Nakhon Phanom	48.2	130.961	11.23	↓ 11.00	↓ 10.73	↓ 10.47	↓10.21	→ 10.13	→ 10.18	11.50	12.00	↓ -0.82	-0.87	0.77	1.27
Thakhek	32.0	129.629	12.19	↓ 11.97	↓ 11.73	↓ 11.49	↓11.22	→ 11.13	→ 11.16	13.00	14.00	↓ -0.81	-0.84	1.27	2.27
Mukdahan	18.5	124.219	11.20	↓ 11.09	↓ 10.92	↓ 10.61	↓10.40	↓ 10.24	→ 10.20	12.00	12.50	↓ -0.89	-0.89	1.08	1.58
Savannakhet	32.6	124.219	9.60	↓ 9.49	↓ 9.22	↓ 8.95	↓8.71	↓ 8.55	→ 8.58	12.00	13.00	↓ -0.91	-0.94	2.78	3.78
Khong Chiam	74.5	89.030	13.50	↑ 13.95	↑ 14.13	→ 14.16	↓14.04	↓ 13.86	↓ 13.71	13.50	14.50	↓ -0.24	-0.24	-0.66	0.34
Pakse	79.0	86.490	11.09	↑ 11.63	↑ 11.96	↑ 12.12	↓12.02	↓ 11.88	↓ 11.71	11.00	12.00	↑ 0.08	0.49	-1.12	-0.12
Stung Treng	10.0	36.790	9.98	→ 10.00	↑ 10.23	↑ 10.36	↑10.47	↓ 10.40	↓ 10.35	10.70	12.00	↑ 0.35	0.47	0.23	1.53
Kratie	13.1	-0.101	21.12	↑ 21.18	↑ 21.38	↑ 21.55	↑21.74	↑ 21.79	↓ 21.73	22.00	23.00	↑ 0.55	0.61	0.21	1.21
Kompong Cham	0.0	-0.930	13.58	↑ 13.76	↑ 13.87	↑ 14.01	↑14.23	↑ 14.37	↑ 14.43	15.20	16.20	↑ 0.67	0.67	0.77	1.77
Phnom Penh (Bassac)	0.0	-1.020	8.60	↑ 8.71	↑ 8.79	↑ 8.87	↑9.02	↑ 9.15	↑ 9.29	10.50	12.00	↑ 0.58	0.58	1.21	2.71
Phnom Penh Port	nr	0.070	7.20	↑ 7.32	↑ 7.40	↑ 7.48	↑7.63	↑ 7.76	↑ 7.90	9.50	11.00	↑ 0.58	0.58	1.60	3.10
Koh Khel	0.0	-1.000	7.37	↑ 7.47	↑ 7.52	↑ 7.55	↑7.59	↑ 7.64	↑ 7.69	7.90	8.40	↑ 0.22	0.22	0.21	0.71
Neak Luong	0.0	-0.330	6.12	↑ 6.20	↑ 6.28	↑ 6.33	↑6.38	↑ 6.44	↑ 6.51	7.50	8.00	↑ 0.31	0.31	0.99	1.49
Prek Kdam	0.0	0.080	7.32	↑ 7.41	↑ 7.49	↑ 7.58	↑7.68	↑ 7.80	↑ 7.91	9.50	10.00	↑ 0.50	0.50	1.59	2.09
Tan Chau	nr	0.000	2.81	↑ 2.90	↑ 2.94	↑ 2.98	↑3.02	↑ 3.10	↑ 3.17	3.50	4.50	↑ 0.27	0.27	0.33	1.33
Chau Doc	0.0	0.000	2.45	↑ 2.52	↑ 2.56	→ 2.59	↑2.63	↑ 2.68	↑ 2.75	3.00	4.00	↑ 0.23	0.23	0.25	1.25

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

- On **23 September**, Khong Chiam and Pakse stations have reached ALARM LEVELS. However, water levels are still rising from Khong Chiam station downward.
- For **24-28 September**, **light** to **moderate rainfall** is expected over the **LMB.** However**, isolated heavy rainfall** may occur mainly in **central part** of the LMB (include the central part of Lao PDR and the northeastern part of Thailand) on **24 September.**
- For **24-28 September**, **Pakse** station is expected to reach **FLOOD LEVEL** on **25 September**. The minimum distance to **flood level** at **Khong Chiam** is **0.34 m**.
- For **24-28 September**, water levels at downstream stations are expected to **continue rising**. **Stung Treng** and **Kratie** stations are expected to be approaching to ALARM LEVELS in the next five days with minimum distance to alarm level of approximately **0.23 m** and **0.21 m,** respectively.

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http://www.mrcmekong.org/
http://ffw.mrcmekong.org/bulletin_wet.php
http://ffw.mrcmekong.org/reportflood.php
https://pmfm.mrcmekong.org/

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 October to Deccember 2024 over the LMB area.

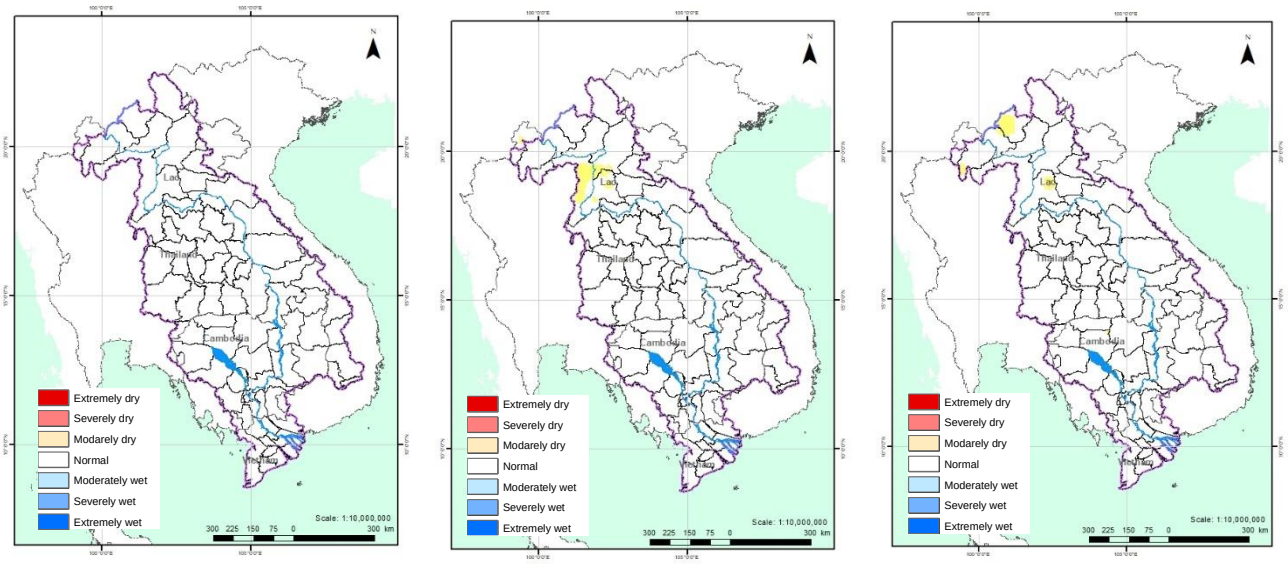


Figure 15. Monthly forecasts of combined drought indicator for a) October, b) November and c) December 2024.

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 November 2024, the upper part of the LMB, including Xayabouly province, is anticipated to experience moderate drought conditions; and in December, Luang Namtha province, is anticipated to experience moderate drought conditions.

7 Summary and Possible Implications

7.1. Rainfall and its forecast

IIn the period of 17 – 23 September 2024, light to very heavy rainfall has been observed over the LMB. Especially, heavy to very heavy rain occurred in some areas in Nong Khai, Khong Chiam, Nakhon Phanom, Savannakhet, Mukdahan, Mahaxai, Paksane, Nakhon Phanom, Thakhek, Kratie.

From 24 – 30 September 2024, Light to moderate rain is expected over the Lower Mekong Basin. However, isolated heavy rain may occur in the central part of the LMB include the central part of Lao PDR on 24 - 25 September..

7.2. Water level and its forecast

At 22 key monitoring stations along the Mekong mainstream from 17 – 23 September 2024, water levels upper stretch of the LMB have decreased from Chiang Saen to Savannakhet stations, while it has been increasing from Khong Chiam downward. The total accumulated volume of the reverse flow to Tonle Sap Lake remains 21.64 Km^3.

In the period of 24 – 28 September 2024, water levels at upstream stations along Mekong mainstream from are likely expected to drop and return to normal conditions. From Khong chiam downward, water levels are expected to significantly rise, resulting in reaching alarm and flood levels for Khong Chiam and Pakse station. At Stung Treng and Kratie stations, water levels are expected to be approaching the alarm levels in the next five days.

7.3. Flash flood and its trends

During last week, due to the very heavy rainfall, a flash flood occurred in Khammoune province in Lao PDR on 22 September.

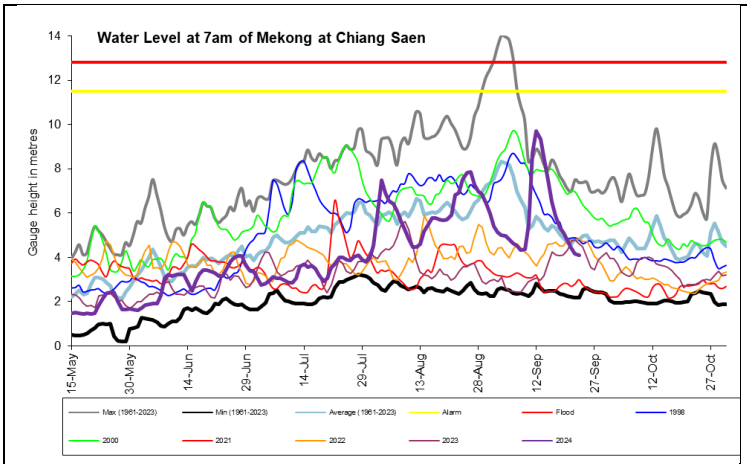
With the predicted of rainfall for the coming week as mentioned earlier in part 2, the flash flood guidance at a low to high level will likely be detected in some areas of the LMB.

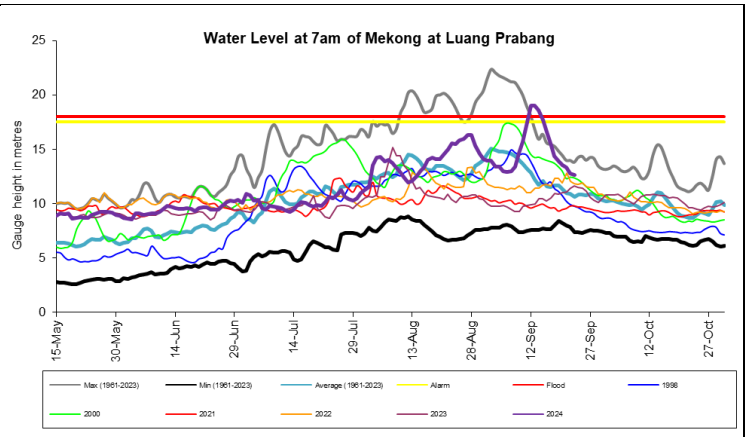
7.4. Drought condition and its forecast

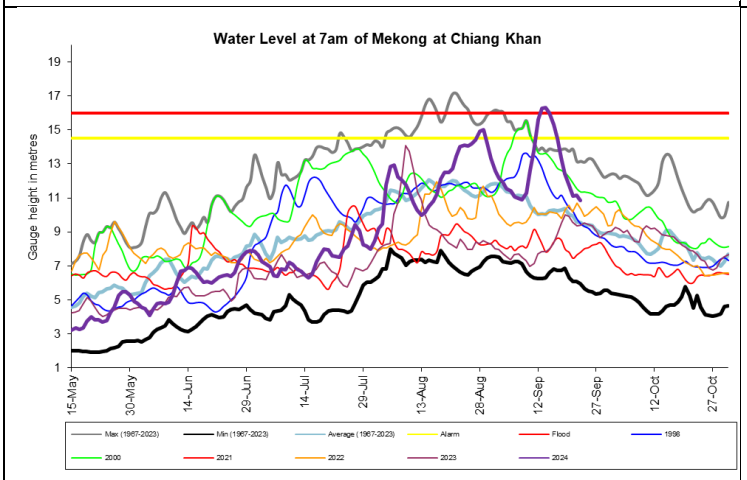
From 17 - 23 September 2024, the LMB is experiencing normal to wet conditions. However, some small areas in Cambodia is experiencing moderate drought include: Mondulkiri, Battambang, and Takeo.
From 24 - 30 September 2024, the LMB is likely at normal conditions. No drought is forecasted for the whole region.
From October to Deccember 2024, The forecast indicates that no significant drought conditions are expected across the entire LMB during this period. However, in November 2024, the upper part of the LMB, including Xayabouly province, is anticipated to experience

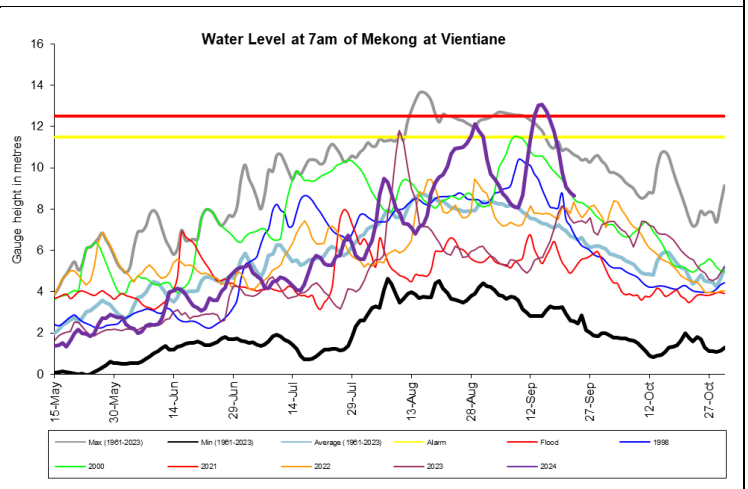
moderate drought conditions; and in December, Luang Namtha province, is anticipated to experience moderate drought conditions.

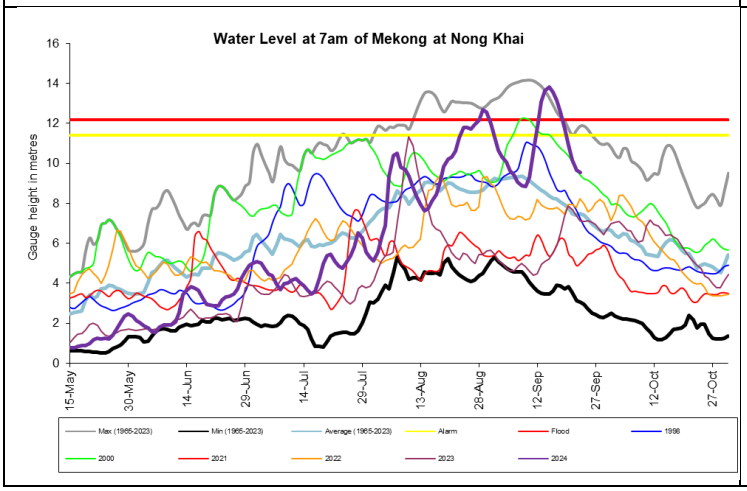
Annex A: Weekly water level monitoring at the 22 key stations

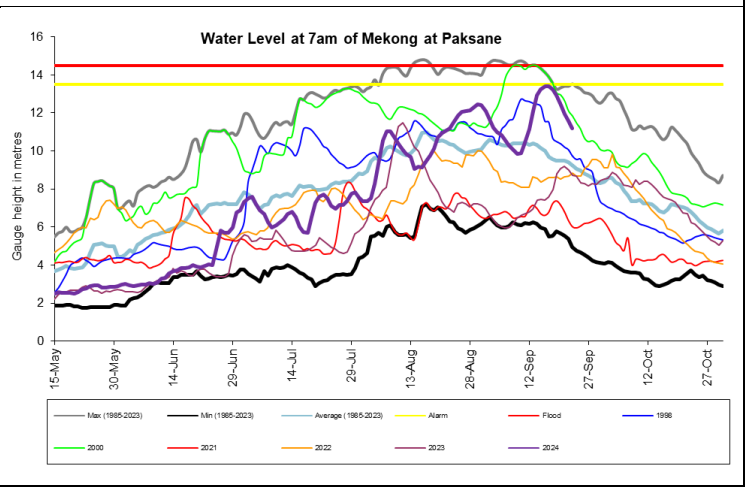


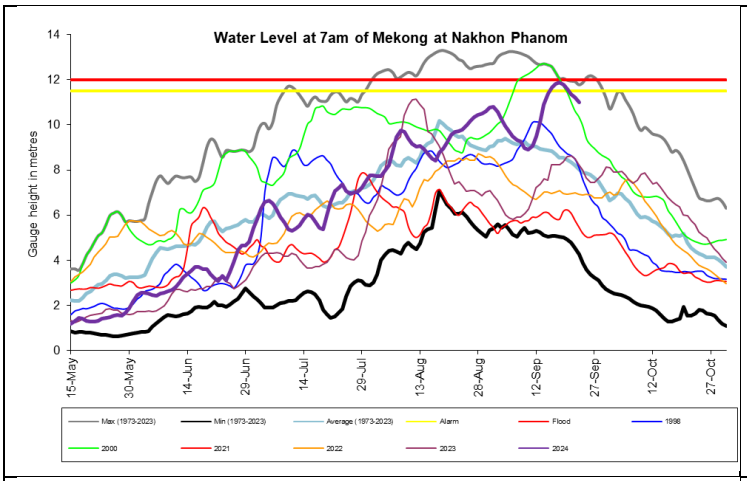


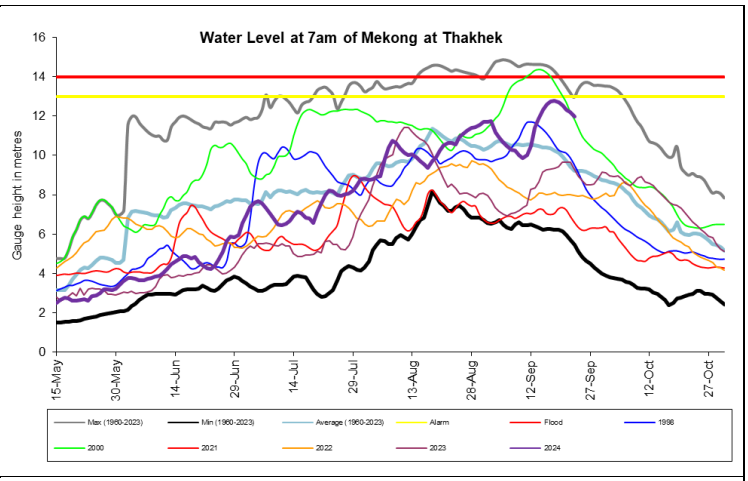


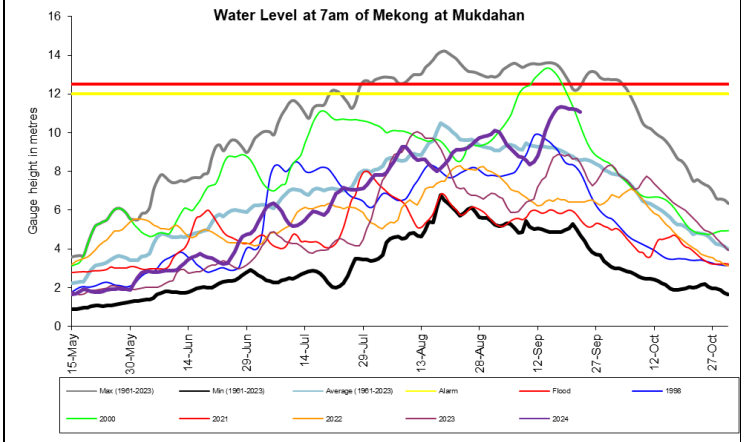


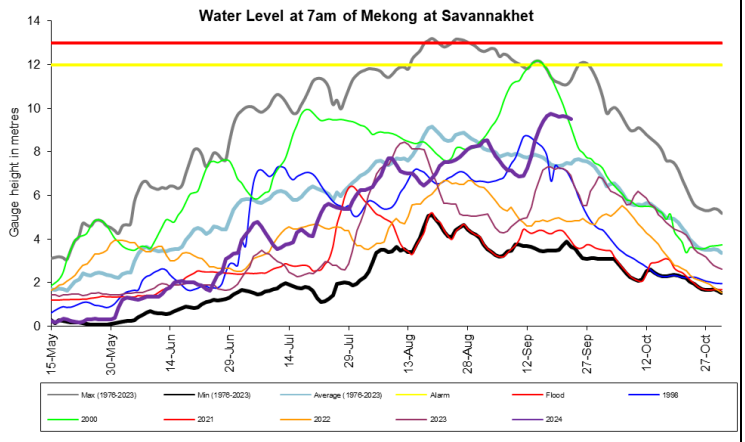


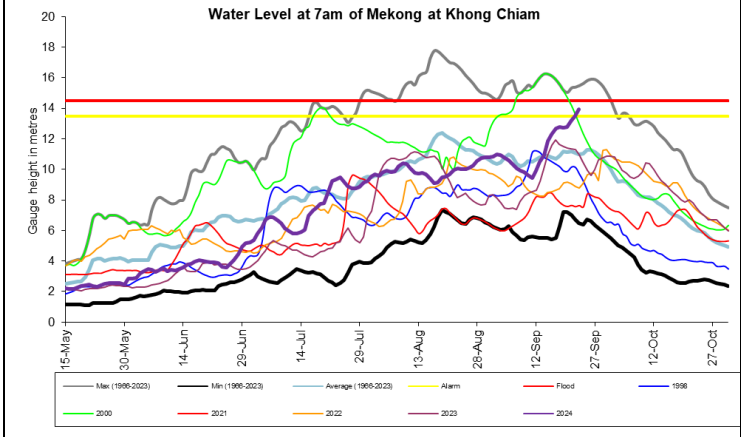


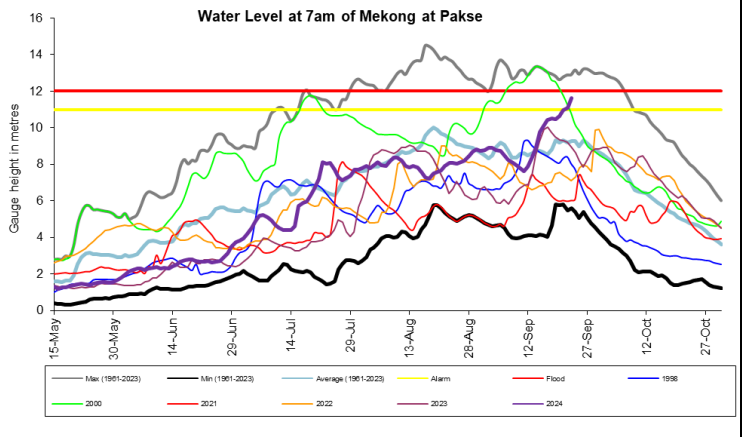

Water Level at 7am of Mekong at Nakhon Phanom
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1973-2023)
Min (1973-2023)
Average (1973-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

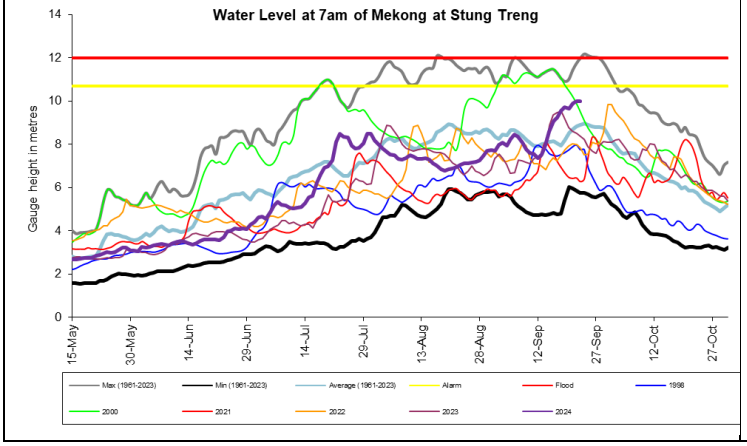

Water Level at 7am of Mekong at Thakhek
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1960-2023)
Min (1960-2023)
Average (1960-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

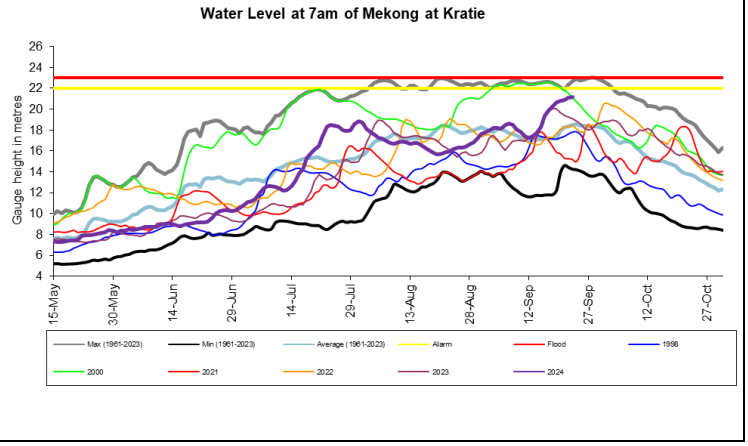

Water Level at 7am of Mekong at Mukdahan
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1961-2023)
Min (1961-2023)
Average (1961-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

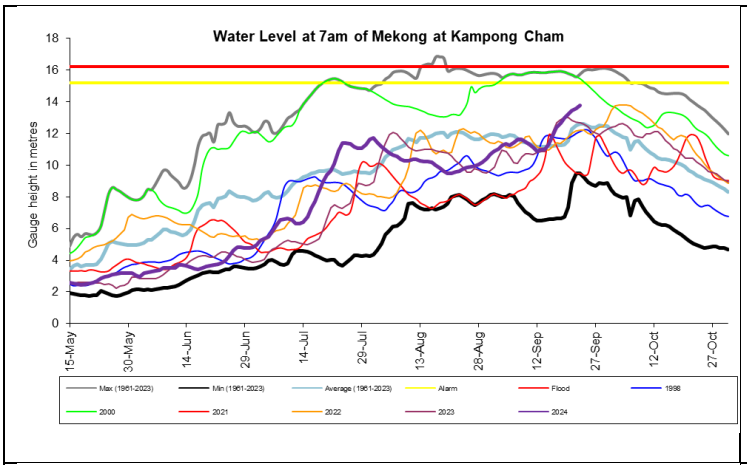

Water Level at 7am of Mekong at Savannakhet
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1976-2023)
Min (1976-2023)
Average (1976-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

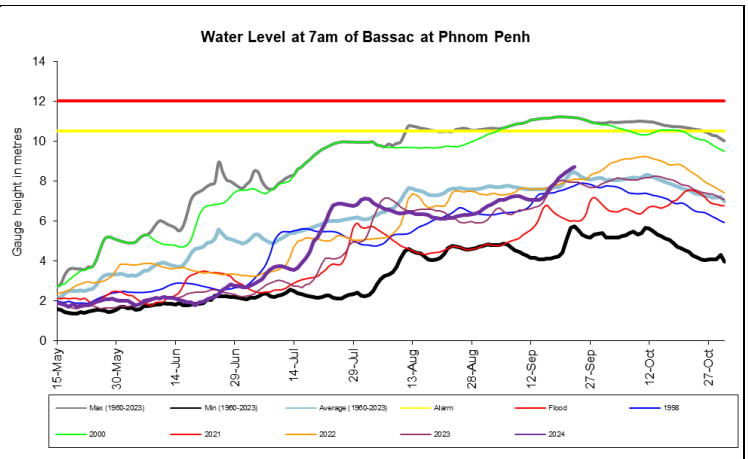

Water Level at 7am of Mekong at Khong Chiam
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1966-2023)
Min (1966-2023)
Average (1966-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

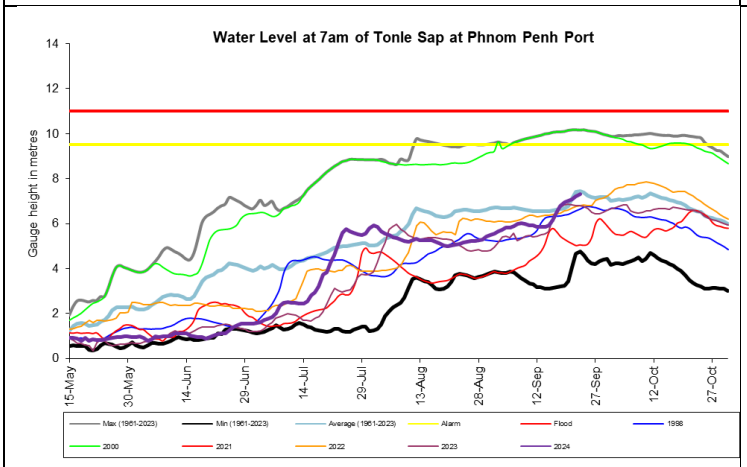

Water Level at 7am of Mekong at Pakse
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1961-2023)
Min (1961-2023)
Average (1961-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

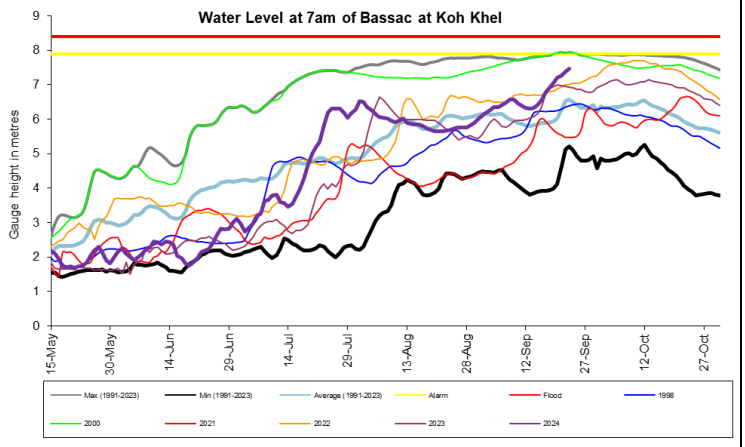

Water Level at 7am of Mekong at Stung Treng
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1961-2023)
Min (1961-2023)
Average (1961-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

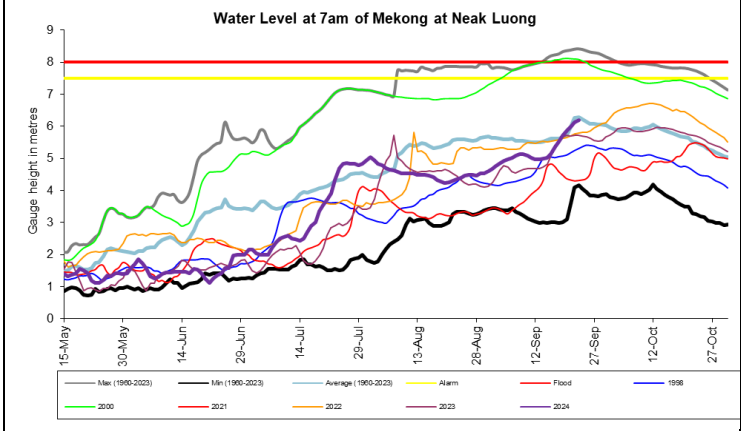

Water Level at 7am of Mekong at Kratie
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1961-2023)
Min (1961-2023)
Average (1961-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

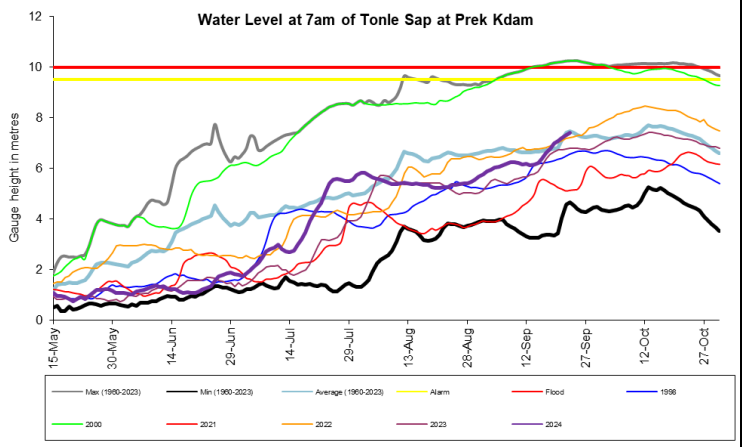

Water Level at 7am of Mekong at Kampong Cham
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1961-2023)
Min (1961-2023)
Average (1961-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

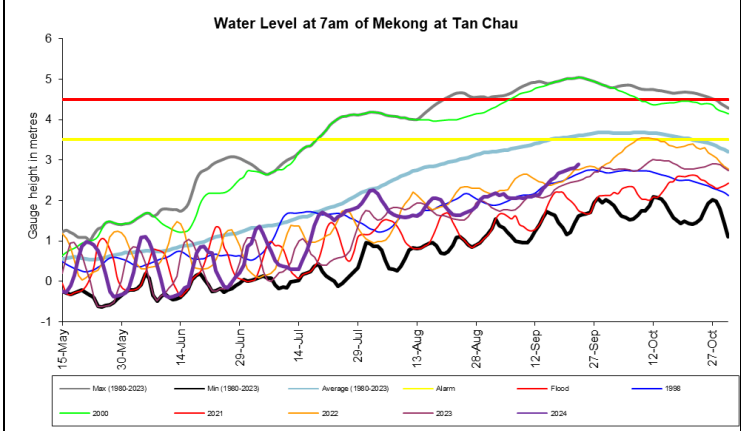

Water Level at 7am of Bassac at Phnom Penh
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1960-2023)
Min (1960-2023)
Average (1960-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

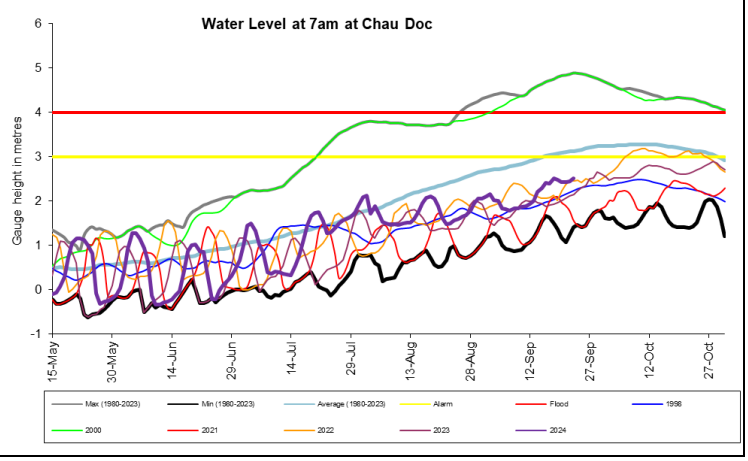

Water Level at 7am of Tonle Sap at Phnom Penh Port
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1961-2023)
Min (1961-2023)
Average (1961-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024


Water Level at 7am of Bassac at Koh Khel
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1991-2023)
Min (1991-2023)
Average (1991-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024


Water Level at 7am of Mekong at Neak Luong
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1960-2023)
Min (1960-2023)
Average (1960-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024


Water Level at 7am of Tonle Sap at Prek Kdam
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1960-2023)
Min (1960-2023)
Average (1960-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024


Water Level at 7am of Mekong at Tan Chau
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1960-2023)
Min (1960-2023)
Average (1960-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024


Water Level at 7am at Chau Doc
Gauge height in metres
15-May
30-May
14-Jun
29-Jun
14-Jul
29-Jul
13-Aug
28-Aug
12-Sep
27-Sep
12-Oct
27-Oct
Max (1960-2023)
Min (1960-2023)
Average (1960-2023)
Alarm
Flood
1998
2000
2021
2022
2023
2024

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
17/09/2024	535.32	5.87	15.54	14.49	12.28	13.17	13.38	11.82	12.74	11.26	9.66	12.67	10.42	9.23	19.84	12.36	7.69	6.47	6.78	5.36	6.61	2.56	2.40
18/09/2024	535.33	5.34	14.36	13.36	11.74	12.57	13.23	11.87	12.79	11.35	9.76	12.80	10.52	9.55	20.22	12.64	7.90	6.79	6.93	5.52	6.79	2.67	2.52
19/09/2024	535.26	5.10	13.91	12.42	10.84	11.73	12.91	11.79	12.72	11.30	9.69	12.75	10.45	9.73	20.65	12.96	8.14	6.94	7.06	5.70	6.99	2.72	2.48
20/09/2024	535.30	4.76	13.52	11.70	9.78	10.93	12.43	11.60	12.54	11.23	9.62	12.78	10.62	9.63	20.77	13.20	8.32	7.01	7.20	5.86	7.08	2.75	2.43
21/09/2024	535.29	4.42	13.36	11.10	9.08	10.17	11.95	11.37	12.33	11.24	9.65	13.19	10.94	9.88	20.85	13.46	8.45	7.08	7.28	5.98	7.21	2.78	2.43
22/09/2024	536.44	4.16	12.80	11.14	8.80	9.67	11.60	11.23	12.19	11.20	9.60	13.48	11.09	9.98	21.12	13.58	8.60	7.20	7.37	6.12	7.32	2.81	2.45
23/09/2024	535.97	4.11	12.66	10.86	8.66	9.55	11.19	11.00	11.97	11.09	9.49	13.95	11.63	10.00	21.18	13.76	8.71	7.32	7.47	6.20	7.41	2.90	2.52
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

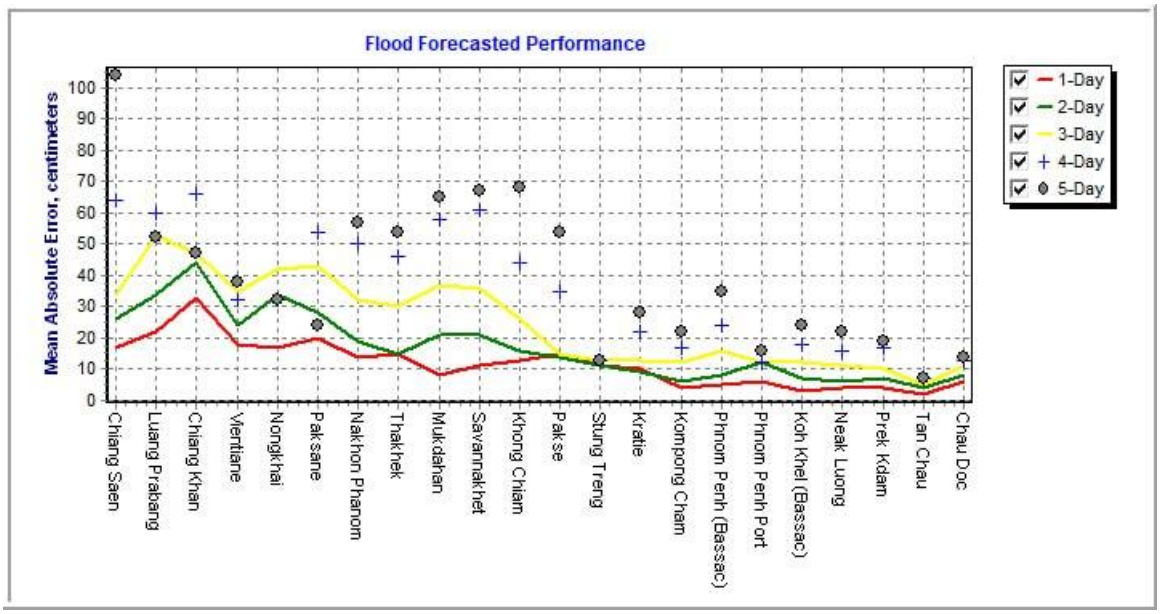
Table A2: Weekly observed rainfall

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
17/09/2024	34.5	0	0	25.4	18	17.8	0.3	12.3	22.6	0.5	12.2	0	8.8	11	109.3	33	2.5		0	3.5	12.4	23.4	0.9
18/09/2024	3.5	2.7	3.4	6.5	3.4	0	3.2	19.1	13.8	5.4	7.6	0	0	6	21.9	11	12		54	31.8	18.4	0.5	20.5
19/09/2024	0	1.2	0	13.3	27.4	78.1	0.6	1.5	1	2.1	0	7.7	14	15	31.4	3	8.7		0	6.5	23.3	0	0
20/09/2024	0	0	2.2	0	6	9.4	5.5	72.1	70.5	125	86	16	16	3	31.3	6	0		0	19.8	7.2	0.7	2.9
21/09/2024	0	0	0	36	42.1	66.3	35.5	10	10.8	16.8	20	0.6	26	4.5	5.7	0	2.3		14.7	21.2	0	8.9	7
22/09/2024	0	1.8	4.4	13	8.5	5.8	1.7	0	0.3	22.8	5.2	4.5	19.8	2	40	22	9.8		0	18.1	6.4	15.5	14
23/09/2024	1	2.2	1.2	13.7	10.4	13.8	113.6	48.2	32	18.5	32.6	74.5	79	10	13.1	0	0		0	0	0	0	0
Sum	39.0	7.9	11.2	107.9	115.8	191.2	160.4	163.2	151.0	191.4	163.6	103.3	163.6	51.5	252.7	75.0	35.3	0.0	68.7	100.9	67.7	49.0	45.3

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 17 to 23 September 2024.



The forecasting values from 17 to 23 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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