



Mekong River Commission

**Weekly Wet Season Situation Report
in the Lower Mekong River Basin
31 August-6 September 2021**

Prepared by
The Regional Flood and Drought Management Centre
7 September 2021

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Key Messages

Key messages for this weekly report are presented below.

Rainfall and its forecast

- Rainfall focused in the areas from Chiang Saen in Thailand to Pakse in Lao PDR, including the lower part in Cambodia and Viet Nam, varying from 8.40 millimetres (mm) to 275.50 mm.
- There will be above-average rainfalls for the next 5 days over the Mekong region from 7 to 12 September 2021 due to low-pressure dominating the Mekong region.

Water level and its forecast

- According to MRC's observed water level data, the outflows at Jinghong hydrological station showed slightly increase over the monitoring period from 31 August to 6 September 2021. It was up about 0.03 m from 535.60 metres (m) on August 31 to 535.63 m on September 6. The outflows increased from 1,050 cubic metres per second (m³/s) on August 31 to 1,071 m³/s on September 6.
- Amid the significant low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Thakhek in Lao PDR increased during August 31- September 6 due to above-average rainfall in the LMB. However, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR were staying close to their historical minimum level. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia, moreover, followed the same trend of the upstream ones and stayed close to their minimum level.
- The water volume of the Tonle Sap Lake during this reporting period was slightly higher than that in 2019 and 2020 of the same periods but was still lower than its LTA.
- Over the next few days, the water levels across most monitoring stations are expected to increase but remain lower than their long-term value in most stations.

Drought condition and its forecast

- The overall drought conditions from Aug 28 to September 3 showed some drought threat in eastern part of the region covering Borikhamxay and Khammuane of Lao PDR and Sakon Nakhon and Nakhon Phanom of Thailand with severe level. Some other locations in the north were also hit by moderate drought including Phongsaly, Luang Prabang, Xieng Khuang, Xaysomboun, Kalasin, Mukdahan and Savannakhet. However, the condition was not serious.
- For the upcoming three-month forecast, the LMB is likely to receive above average rainfall in September and October mainly in the central and southern parts of the region. Like 2020, the forecast shows that October is likely the wettest month of the year. November is forecasted to receive from average to above average rainfall throughout the LMB.

1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydrological and drought situation in the Lower Mekong River Basin (LMB) for the period from **31 August-6 September 2021**. The trend and outlook for water levels are also presented.

This analysis is based on the daily hydro-meteorological data provided by the Mekong River Commission (MRC) Member Countries (MCs) – Cambodia, Lao PDR, Thailand, and Viet Nam – and on satellite data. All the water levels indicated in this report refer to an above zero gauge of each station.

The report covers the following topics that are updated weekly:

- General weather patterns, including rainfall patterns over the LMB
- Water levels in the LMB, including in the Tonle Sap Lake
- Flash flood and drought situation in the LMB
- Weather, water level and flash flood forecast, and
- Possible implications.

Mekong River water levels are updated daily and can be accessed from:
http://ffw.mrcmekong.org/bulletin_wet.php.

Drought monitoring and forecasting information is available at:
<http://droughtforecast.mrcmekong.org>

Flash flood information is accessible at: <http://ffw.mrcmekong.org/ffg.php>

2 General Weather Patterns

The weather outlook bulletins for three months (September, October and November) and the weather maps issued by the Thai Meteorological Department (TMD) were used to verify weather conditions in the LMB.

The TMD stated that above-average rainfall will start from September which is influenced by the Southwest Monsoon of the rainy season period. During this time, there will be more rainstorms, some tropical storms, and low-pressure air mass prevailing over the Mekong region. The TMD also predicted that an influential Southwest Monsoon is likely to occur and may cause more rainfall in the Mekong region between September and October.

[Figure 1](#) presents the weather map of 6 September 2021, showing that a low pressure is dominating the upper part of Lao PDR and Viet Nam and might affect the 3S area (Sesan, Sre Pok, and Sekong) in Cambodia and Viet Nam of the LMB.

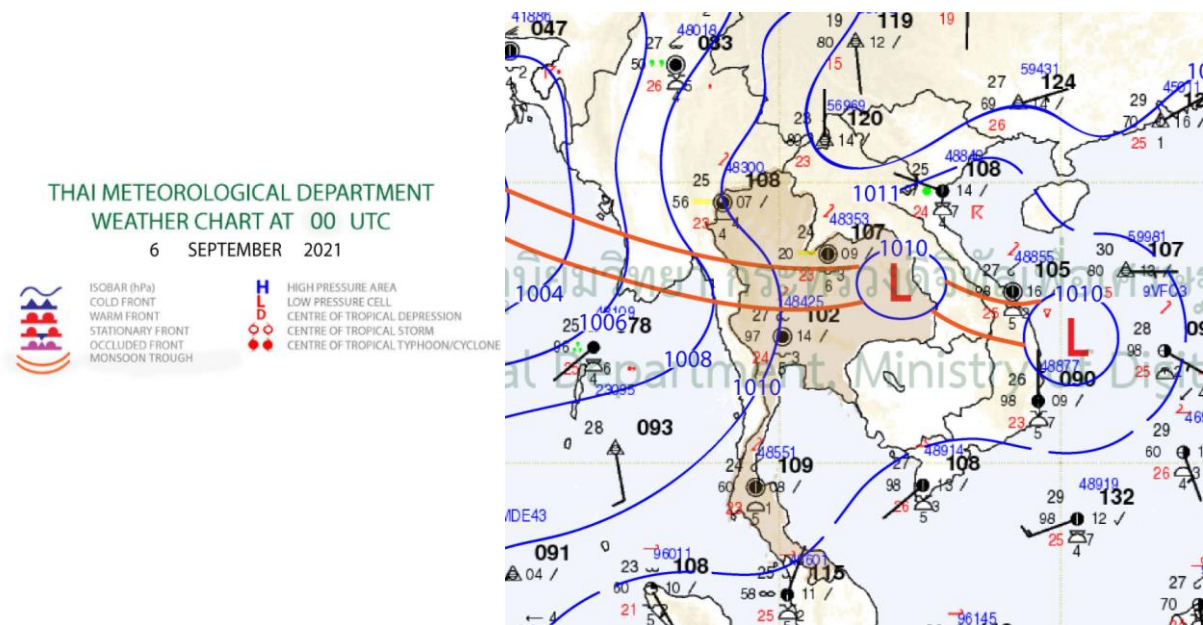


Figure 1. Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), a highest probability of wetter condition is predicted over of the lower part of the Mekong region covering Lao PDR and Thailand from 6 to 19 September 2021, during the 1st and 2nd week of September. Nonetheless, LMB is likely dominated by wetter condition, which may receive above average rainfall in general.

[Figure 2](#) shows the outlook of comparative wet conditions from 6 to 19 September 2021 covering the whole LMB region, based on results from the NCEP model (National Centres for Environmental Prediction).

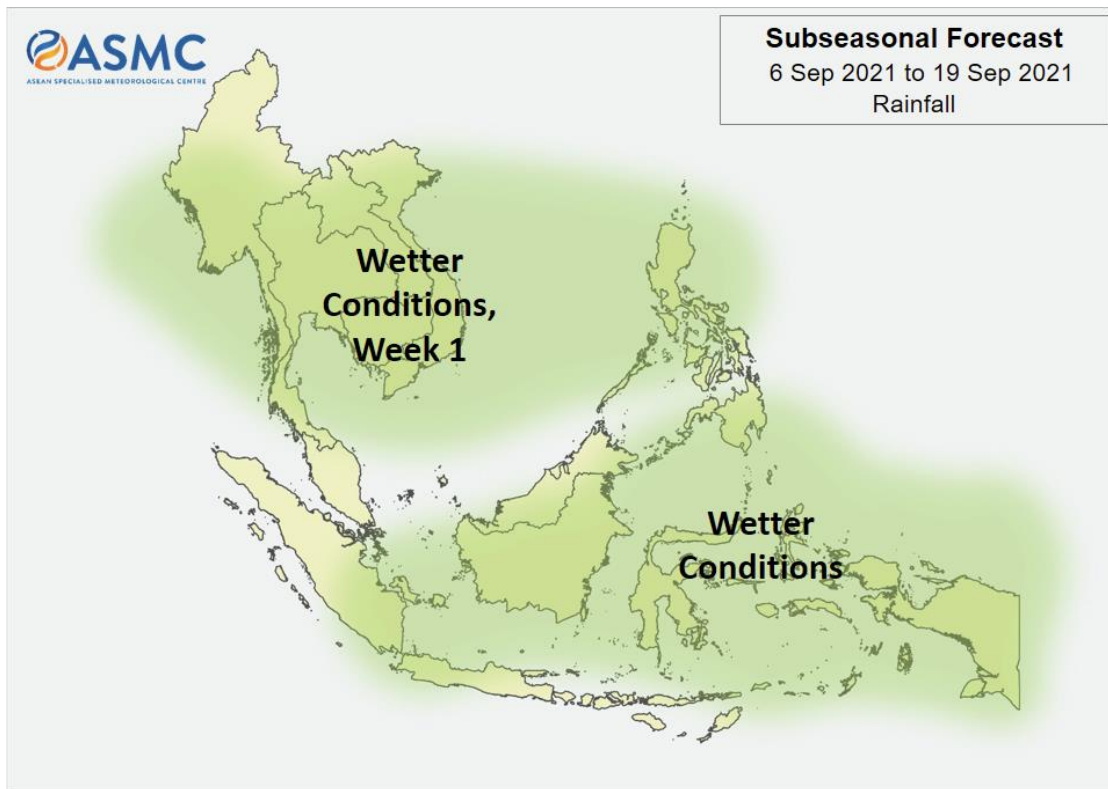


Figure 2. Outlook of wet and dry conditions over the Asian countries by ASMC.

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

There were low-pressure lines taking place in the lower part of the LMB during 6 September 2021, as shown in [Figure 1](#), which would bring rain to some areas of the LMB. But based on the Tropical Storm Risk (TSR), as displayed in [Figure 3](#), there was no sign of tropical depression (TD), tropic storm (TS), or typhoon (TY) in the Mekong region up to 6 September 2021.

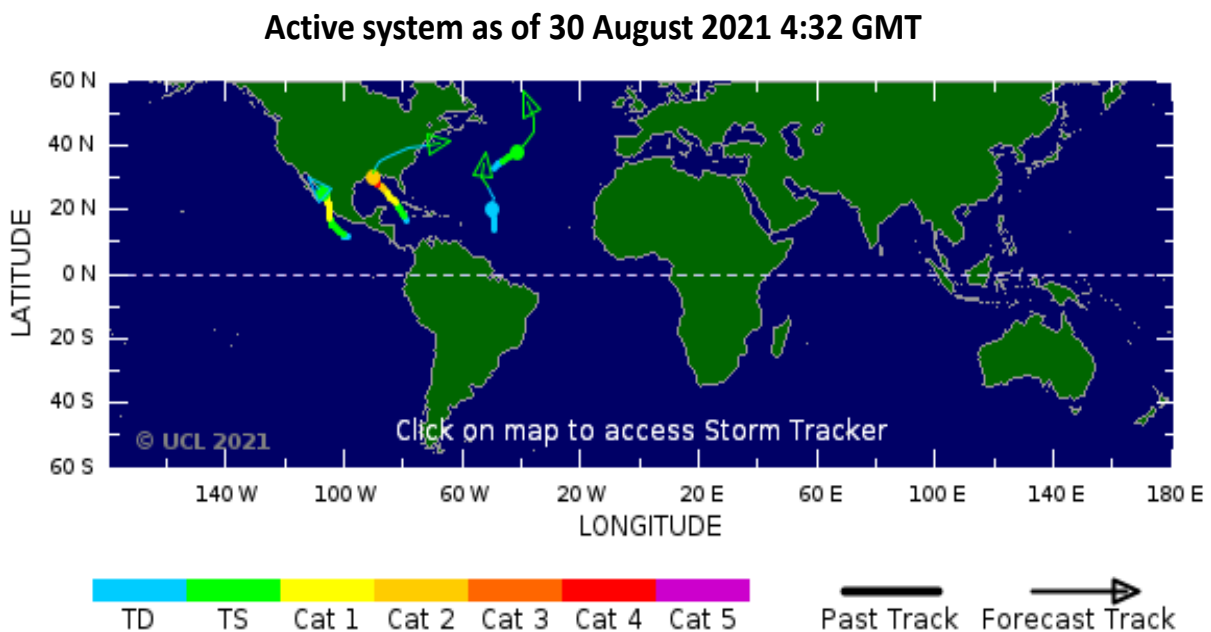


Figure 3. A tropical depression risk observed on 6 September 2021.

2.2 Rainfall patterns over the LMB

This week, rainfall focused in the areas from Chiang Saen in Thailand to Pakse in Lao PDR, including the lower part in Cambodia and Viet Nam, varying from 8.40 mm to 275.50 mm. The weekly total rainfall from 31 August to 6 September 2021 in this reporting week was considered high, compared with last week rainfall in the Lower part of the LMB (see [Figure 4](#)).

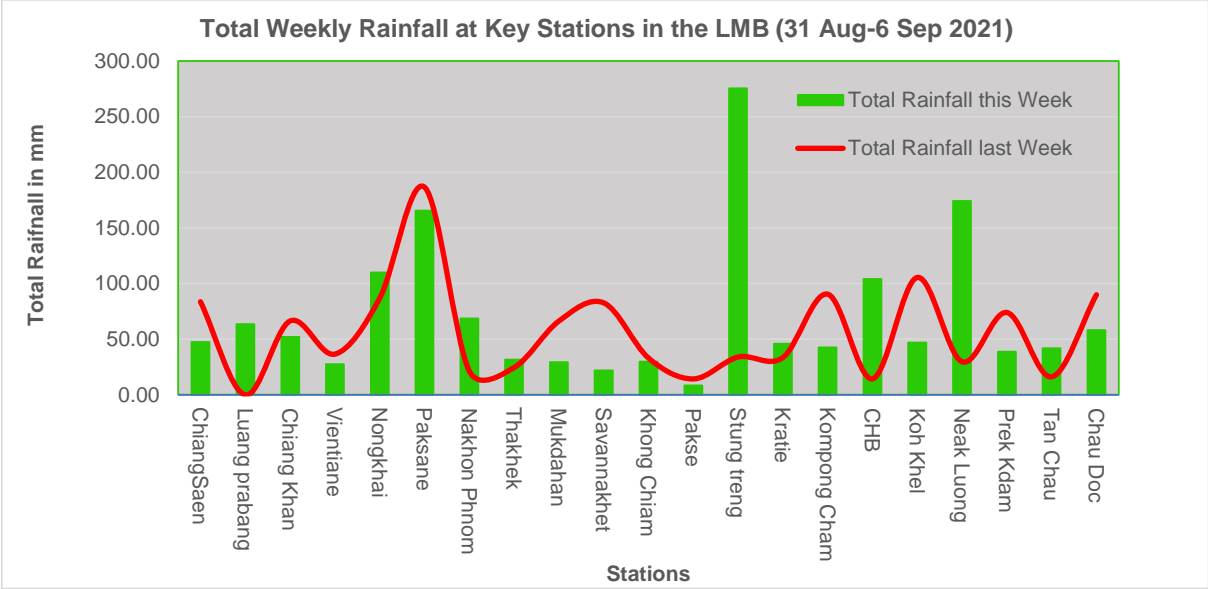


Figure 4. Weekly total rainfall at key stations in the LMB during 31 August - 6 September 2021.

To verify area rainfall distribution, [Figure 5](#) shows a map of the weekly accumulated rainfall based on observed data provided by the MRC MCs – Cambodia, Lao PDR, Thailand, and Viet Nam – from 31 August-6 September 2021.

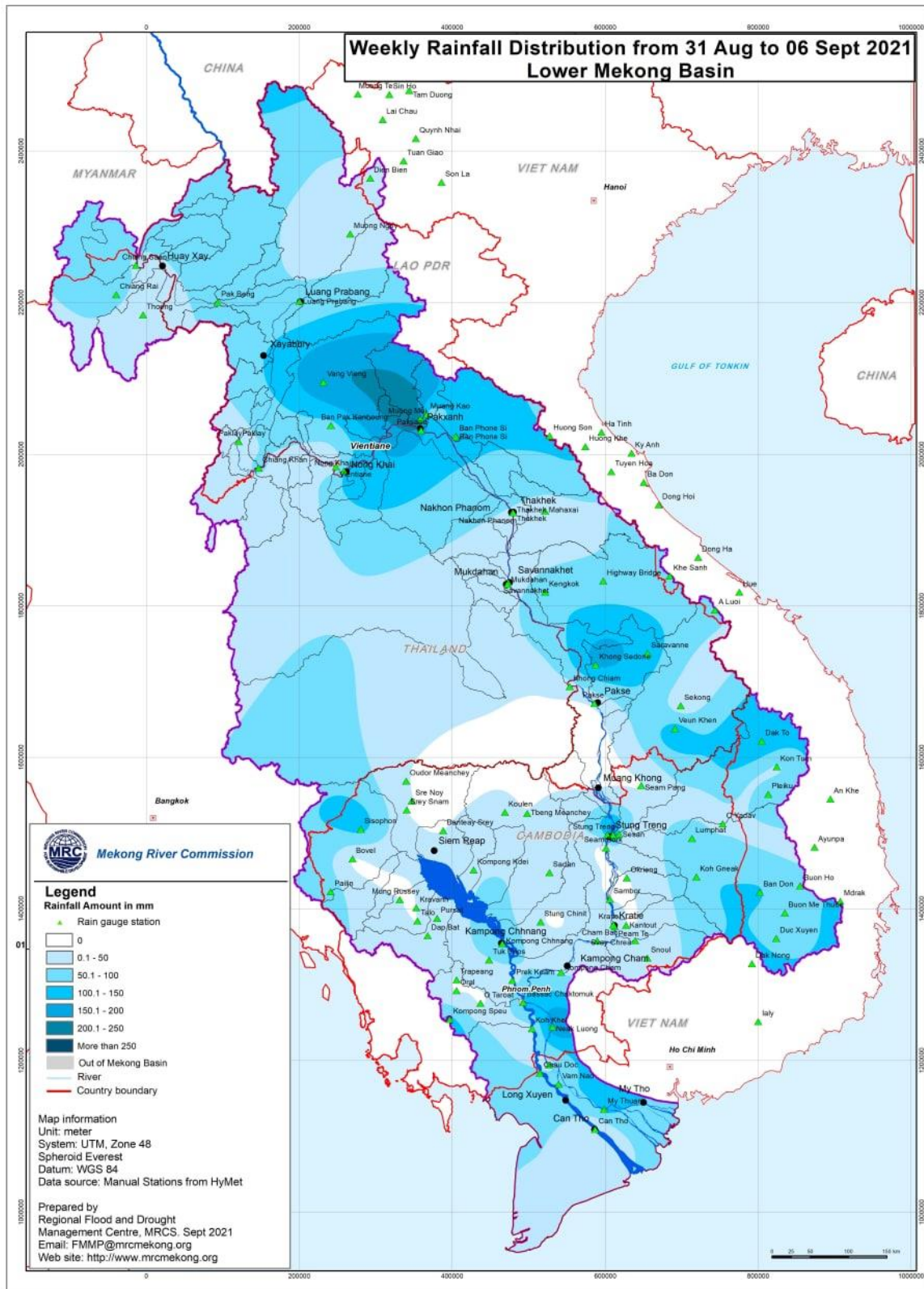


Figure 5. Weekly rainfall distribution over the LMB during 31 August - 6 September 2021.

3 Water Levels in the Lower Mekong River

The hydrological regimes of the Mekong mainstream are illustrated by recorded water levels and flows at key mainstream stations: at Chiang Saen in Thailand to capture mainstream flows entering from the Upper Mekong Basin (UMB); at Vientiane in Lao PDR to present flows generated by climate conditions in the upper part of the LMB; at Pakse in Lao PDR to investigate flows influenced by inflows from the larger Mekong tributaries; at Kratie in Cambodia to capture overall flows of the Mekong Basin; and at Viet Nam’s Tan Chau and Chau Doc to monitor flows to the Delta.

The key stations along the LMB and their respective model application for River Flood Forecasting during the wet season from June to October and River Monitoring during the dry season from November to May are presented in [Figure 6](#). The hydrograph for each key station is available from the MRC’s River Flood Forecasting: <http://ffw.mrcmekong.org/overview.php>. The weekly water levels and rainfall at each key station are summarised in [Annex A](#).

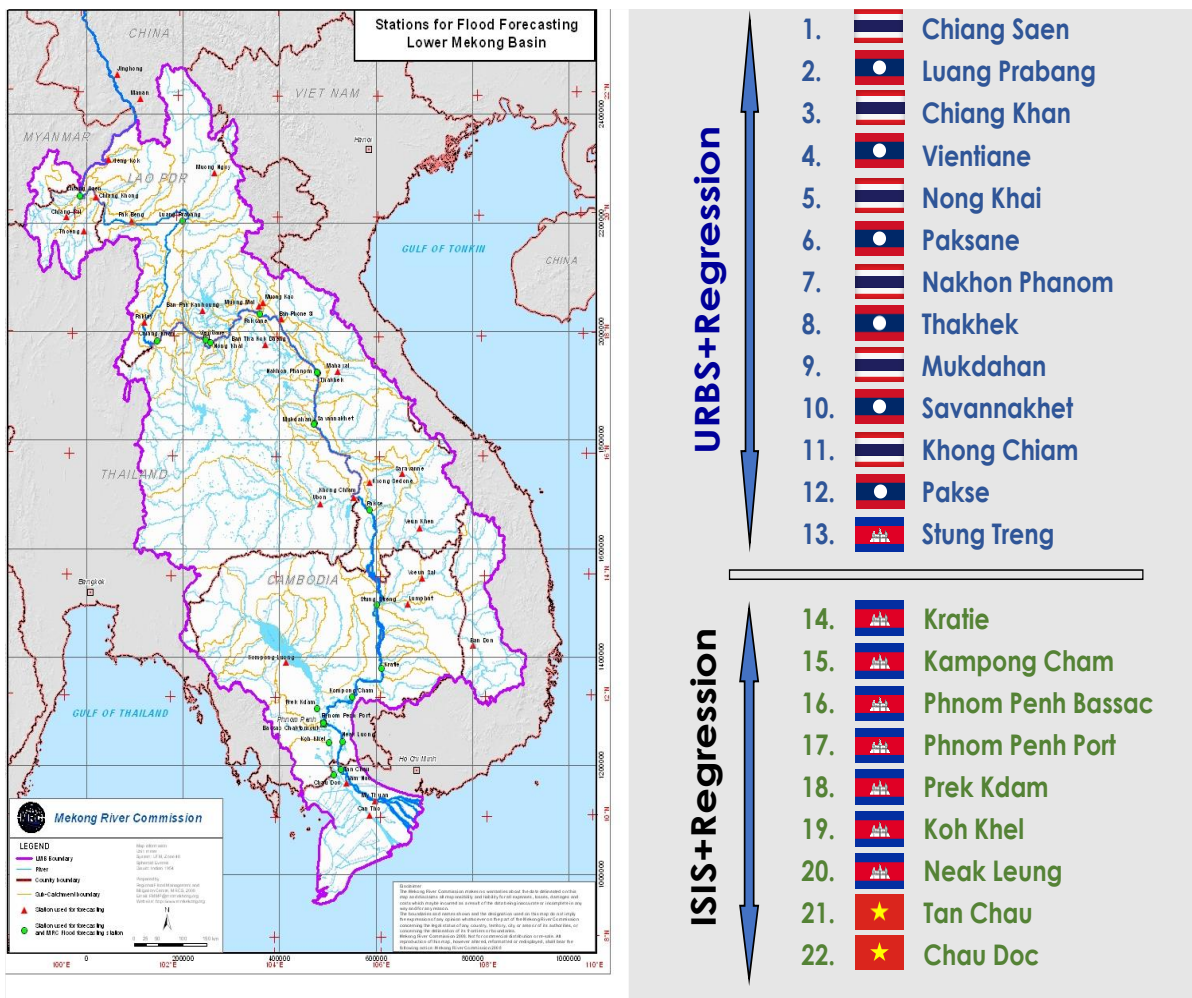


Figure 6. Key stations and model application for River Monitoring and Flood Forecasting.

According to MRC’s observed water level data, the outflows at Jinghong hydrological station showed slightly increase over the monitoring period from 31 August to 6 September 2021. It was up about 0.03 m from 535.60 metres (m) on August 31 to 535.63 m on September 6. The outflows increased from 1,050 m³/s on August 31 to 1,071 m³/s on September 6, 2021. [Figure 7](#) below presents water level fluctuations at the Jinghong hydrological station¹, indicating that the trend of water level from 31 August to 6 September 2021 was in between its LTA and minimum level.

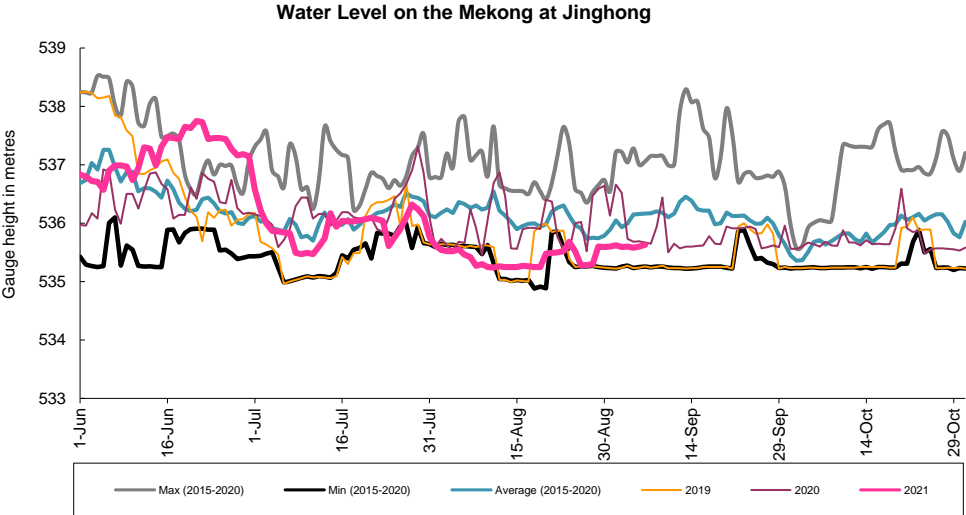


Figure 7. Water level at the Jinghong hydrological station during 1 July-6 September 2021.

Amid the significant low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Thakhek in Lao PDR increased during August 31- September 6 due to above-average rainfall in the LMB. However, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR were staying close to their historical minimum level. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia, moreover, followed the same trend of the upstream ones and stayed close to their minimum level.

Based on hydrological phenomenon, the contribution of inflow water from the upstream of Lancang-Mekong in China to the Mekong mainstream is about 16% in total during the wet season from June to October. The whole inflow of water into the LMB is influenced by rainfall at the Mekong mainstream and its tributaries during the wet season.

Chiang Saen and Luang Prabang

The water level from 31 August to 6 September 2021 at Thailand’s Chiang Saen slightly decreased from 3.43 m to 3.22 m, showing 0.21 m down and was about 2.67 m lower than its LTA. Similarly, the water level at Luang Prabang station in Lao PDR also decreased from 10.52 m to 10.24 m during the reporting period. This level shows 4.51 m lower than its LTA value. The trend – sometimes higher or lower to its historical maximum and LTA values – has been

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>.

observed since early 2021. The phenomenon was potentially caused by upstream dam operations, downstream Xayaburi dam, and heavy rainfall in the surrounding areas. The water levels at Chiang Saen and Luang Prabang are shown in [Figure 8](#) below.

Being situated between the upstream (Nam Beng, Nam Ou, Nam Suong, and Nam Khan) and downstream (Xayaburi) hydropower dams, the Luang Prabang station has a unique characteristic as it is influenced by the operations of all its surrounding dams. **Thus, the water level at this station can possibly change very rapidly during the early of wet and dry season.**

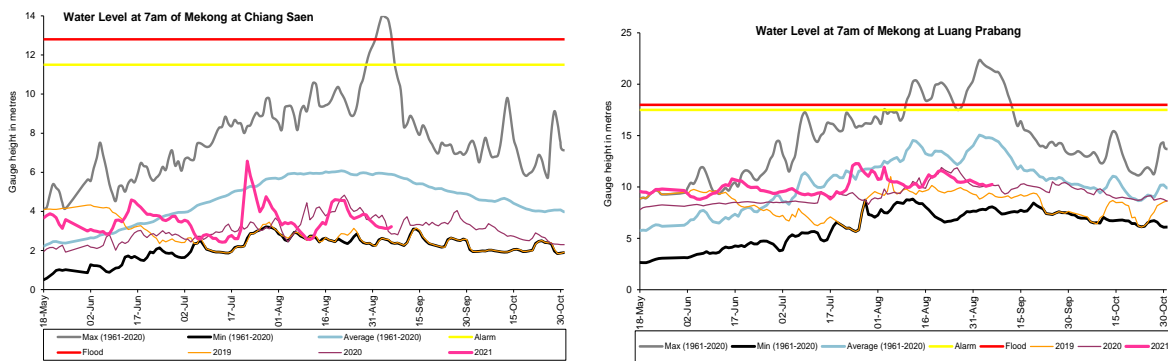


Figure 8. Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) decreased from 8.34 m to 7.91 m during the reporting week. This decrease showed 3.53 m lower than its Long-Term- Average (LTA). The water level downstream at Vientiane in Lao PDR followed the upstream trend. It dropped from 5.42 m to 5.28 m and was about 3.32 m lower than its LTA during Aug 31-September 6. At Nong Khai station in Thailand, the water level also decreased during the reporting period. It was down about 0.04 m, significantly dropping from 5.35 m to 5.31 m and showing 4.16 m lower than its LTA. Due to above-average rainfall, water level at Paksane in Lao PDR slightly increased about 0.30 m, rising from 6.51 m to 6.81 m. The WL at this station was still about 4.14 m lower than its LTA. The recent increased water levels were obviously due to the rainfall caused by low pressure in the sub-catchment area, although less inflow from upstream and the influence of the Nam Ngum dam operation located upstream (see figure 1). The water levels at Vientiane and Paksane are shown in [Figure 9](#) below.

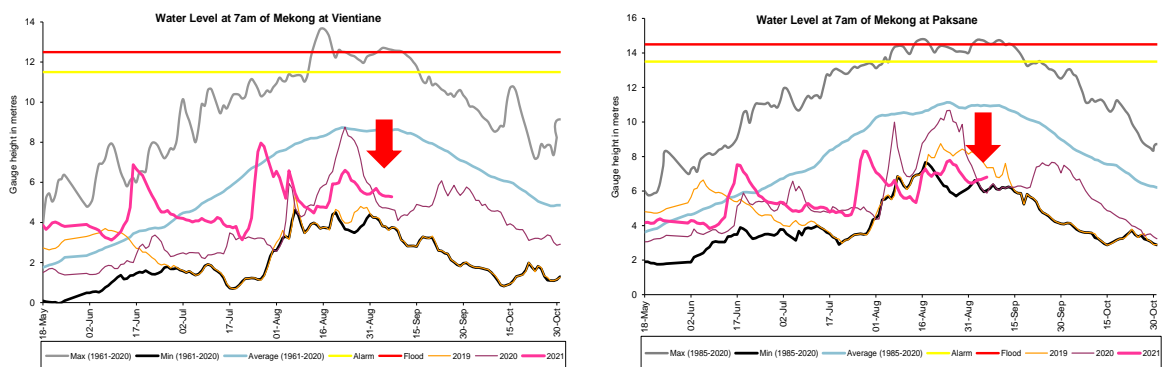


Figure 9. Water levels Veintiane and Paksane in Lao PDR.

Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand and Thakhek in Lao PDR decreased about 0.20 m due to low rainfall and inflow from upstream, while from Mukdahan in Thailand to Pakse in Lao PDR dropped about 0.30 m. **However, water levels at these stations (Nakhon Phanom to Pakse) were staying close to their historical minimum level, which considered very critical.** [Figure 10](#) shows the water levels at Nakhon Phanom and Pakse stations.

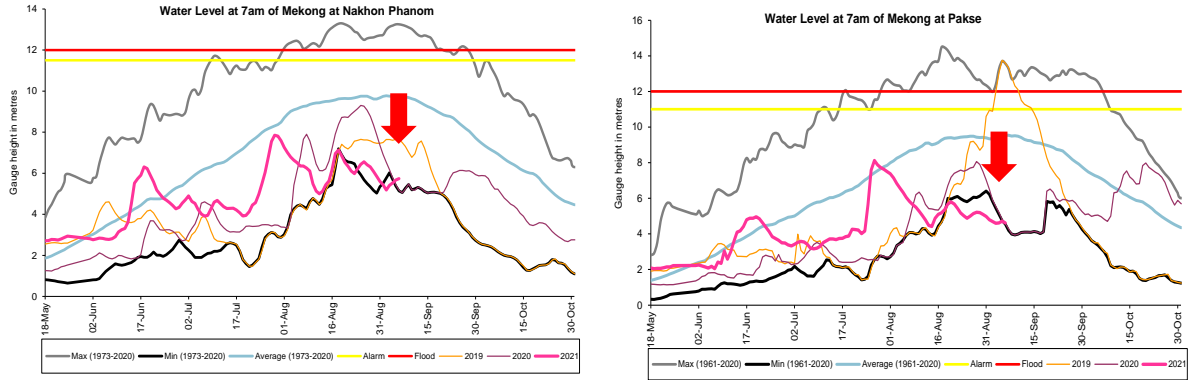


Figure 10. Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR

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

Due to below-average rainfall from the upstream part of the Mekong River and the 3S river (Sekong, Se San, and Sre Pok), the water levels from Stung Treng to Kratie in Cambodia slightly went down during 31 August-6 September 2021. This week water level at Stung Treng and Kratie decreased about 0.01 m and 0.12 m, respectively, moving towards their minimum level (as showed in [Figure 11](#)). On the contrary, the water level at Kompong Cham increased about 0.07 m and showed 5.08 m lower than its LTA. **Water levels at these stations were staying close to their minimum level, which considered very critical.**

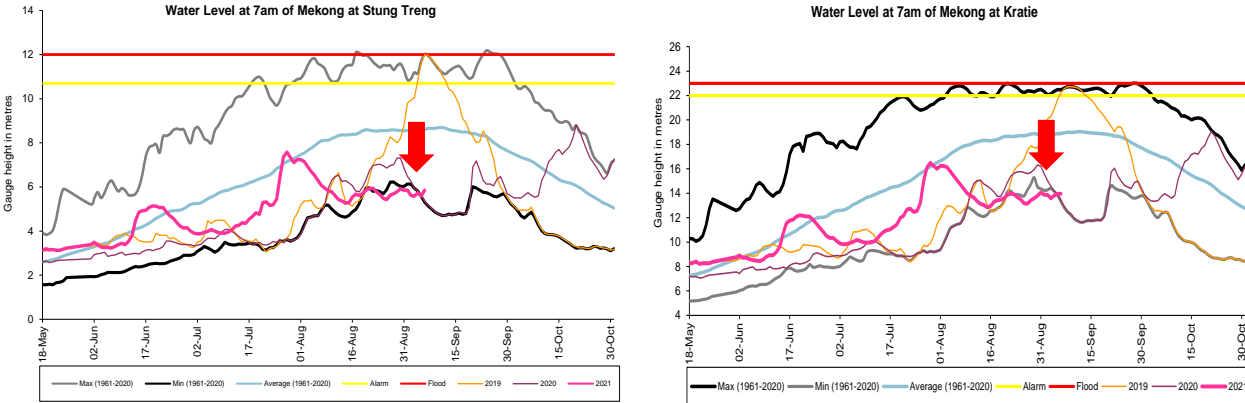


Figure 11. Water levels at Stung Treng and Kratie on the Mekong River.

At Chaktomuk on the Bassac River, due to rainfall in catchment inflow, the water level increased by about 0.15 m and stayed 0.04 m higher than its minimum value; while at Koh Khel, water level went up 0.14 m, staying 0.03 m higher than its minimum value. The water

level at Prek Kdam on the Tonle Sap Lake increased about 0.17 m and was about 0.06 m higher than its minimum value. The water level at the Tonle Sap Lake (observed at Kompong Luong) was similar to Prek Kdam station’s water level. The increased water level was because of more inflow and rainfall contributed from upstream of the Tonle Sap Lake area during the reporting period. The water level at the Tonle Sap Lake (observed at Kompong Luong) followed the same trend of Prek Kdam station’s water level. **Water levels at these stations were staying slightly higher than their minimum levels, which still considered very critical.**

Tidal stations at Tan Chau and Chau Doc

Like last week, the water levels from 31 August to 6 September 2021 at Viet Nam’s Tan Chau and Chau Doc fluctuated due to daily tidal effects from the sea. The fluctuation levels were between 1.04 m and 1.59 m; they were in between the range of their LTA and historical minimum levels and **considered critical.**

The Tonle Sap Flow

At the end of the dry season, when water levels along the Mekong River increase, flows of the Mekong River reverse into the Tonle Sap Lake and then to the Delta. This phenomenon normally takes place from June to early August.

[Figure 12](#) shows the seasonal changes of the outflow of the Tonle Sap Lake at Prek Kdam in comparison with the flows of 2018 and 2019, and their LTA levels (1997–2019). Up to September 6 of this reporting period, **it was observed that the main inflow/reverse flow to Tonle Sap Lake slightly increased due to average-rainfall from upstream.** This increased inflow of Tonle Sap Lake was also most likely caused by more inflows from the catchment area. The inflow into the Tonle Sap Lake condition in 2021 was higher than 2019 and 2020 inflow conditions. For next week, the above average rainfall is forecasted for the Tonle Sap area; thus, the inflow into the the Tonle Sap Lake is likely to continue rising from the current level.

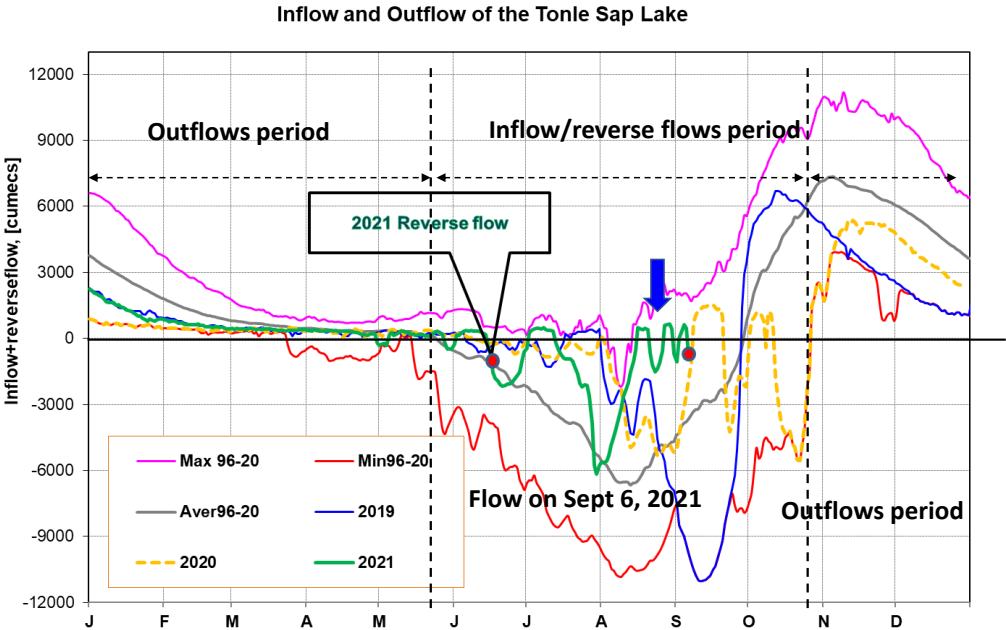


Figure 12. Seasonal change of inflows and outflows of Tonle Sap Lake

The water volume of the Tonle Sap Lake up to this point has been considered low in comparison with its LTA level. [Figure 13](#) shows seasonal changes in monthly flow volumes up to September 6 for the Lake compared with the volumes in 2018, 2019 and 2020, their LTA, and the fluctuation levels (1997–2019). It shows that up to September 6, **the water volume of the Tonle Sap Lake is higher than the levels in 2019 and 2020 during the same period**. The figure is displayed in [Table 1](#), which indicates that the Tonle Sap Lake has been affected by water levels from the Mekong River, the tributaries, and rainfall in the surrounding sub-catchments.

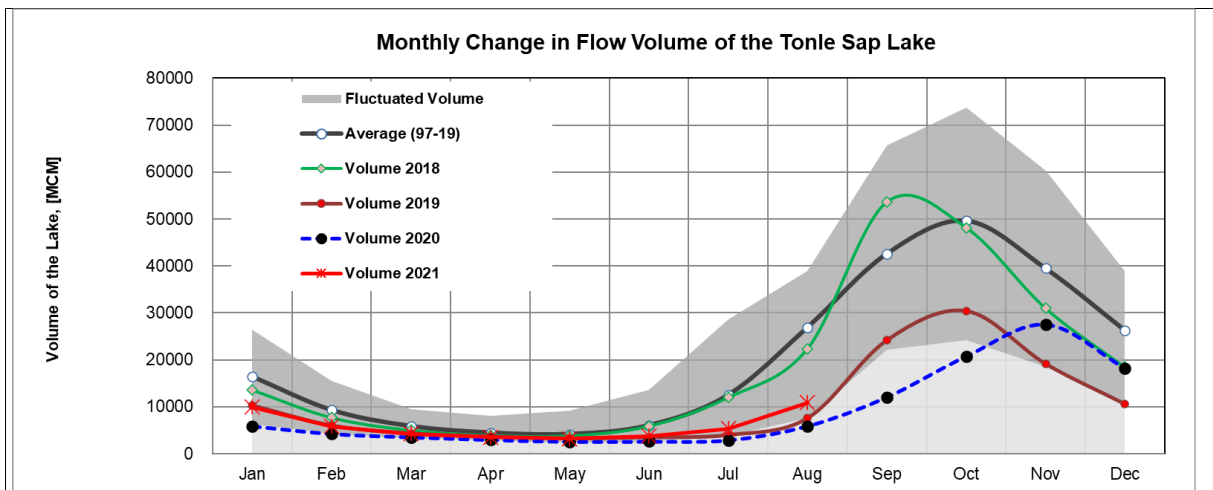


Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.

Table 1. The monthly change in the flow volume of Tonle Sap Lake.

Month	Average Volume (97-19) [MCM]	Max Volume [MCM]	Min Volume [MCM]	Volume 2018 [MCM]	Volume 2019 [MCM]	Volume 2020 [MCM]	Volume 2021 [MCM]
Jan	16452.95	26357.53	6272.01	13633.41	10285.31	5906.80	9923.80
Feb	9312.36	15596.22	4281.41	7729.72	6019.30	4264.19	5832.97
Mar	5868.92	9438.24	3350.92	5037.06	4354.62	3553.99	4264.88
Apr	4474.98	8009.14	2875.42	3956.47	3667.47	2992.61	3556.68
May	4166.07	9176.93	2417.81	3864.00	3266.43	2594.92	3240.78
Jun	6034.10	13635.01	2470.54	5919.18	3517.06	2641.88	3798.29
Jul	12502.58	28599.56	3832.51	12024.96	4001.99	2925.86	5346.73
Aug	26934.35	39015.12	7554.93	22399.65	7622.71	5941.07	10921.95
Sep	42644.05	65632.35	22180.73	53639.54	24194.19	12105.31	
Oct	49698.19	73757.23	24276.79	48193.08	30358.38	20799.13	
Nov	39542.58	60367.33	18576.01	31036.07	19112.65	27546.80	
Dec	26325.13	38888.95	10869.43	18469.21	10577.29	18251.65	
	Critical situation, compared with historical Min values						
	Normal condition, compared with LTA (Long term average)						
	Low volume situation, compared with LTA values						
Unit: Million Cubic Meter (1 MCM= 0.001 Km ³)							

This demonstrates the influence of the relationships between the reverse flows, water levels of the Mekong River, inflows from tributaries, and the flow direction in the complex hydraulic environment of the Tonle Sap Lake during the wet and dry seasons. The data show that about half of the annual inflow volume into the Tonle Sap Lake has originated from the Mekong mainstream. Thus, flow alterations in the mainstream could have direct impact on the Tonle Sap Lake water levels and on its hydrology.


4 Flash Flood in the Lower Mekong Basin


The monsoon trough came across the lower northern, central, eastern, and north-eastern parts of the LMB during the first half of the week. Then it moved northward covering the northern, upper north-eastern parts, and upper Lao PDR toward the low-pressure cell over the Gulf of Tonkin and upper Viet Nam. In addition, the southwest monsoon which prevailed over the Andaman Sea, Thailand and the Gulf of Thailand was strengthening to the moderate southwest monsoon during the second half of the week. These conditions caused plentiful rainfall over upper part of Thailand almost entire week creating some flash floods in some areas. In the southern part of the LMB, rainfall was decreasing during the second half of the week.

From August 31 to September 6, the LMB was affected by two weather factors including (i) The monsoon trough which came across the lower northern, central, eastern and north-eastern parts during the first half of the week then it moved northward to cover the northern, upper north-eastern parts, and upper Lao toward the low pressure cell over the Gulf of Tonkin and upper Viet Nam, respectively; (ii) the southwest monsoon which prevailed over the Andaman Sea and the Gulf of Thailand; it was strengthening to become the moderate southwest monsoon during the second half of the week. These conditions caused moderate or heavy rainfall over upper and lower parts of the LMB almost the entire week.

According to the MRC-Flash Flood Guidance System (MRC-FFGS) and analysis, flash flood events were detected during the reporting period in several areas of the LMB at low risk level, as shown in [Figure 14](#) and [Table 2](#).

Table 2. Detected flash flood in Thailand, Lao PDR, Cambodia, and Viet Nam on September 5.

 Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Thailand																
Date of FFG products 05/09/2021 00:00 UTC time																
01-Hour Flash Flood Risk and Location				03-Hour Flash Flood Risk and Location					06-Hour Flash Flood Risk and Location							
Provinces	Districts	Region	Level Risk	Provinces	Districts	Region	Level Risk	Provinces	Districts	Region	Level Risk	Provinces	Districts	Region	Level Risk	
Ubon Ratchathani	Lao Sua Kok	Northeastern	Low-Risk	NO ANY DETECTION OF FLASH FLOOD WITHIN NEXT 03-HOUR					Ubon Ratchathani	Nam Yun	Northeastern	Low-Risk	Ubon Ratchathani	Lao Sua Kok	Northeastern	Low-Risk
Si Saket	Khun Han	Northeastern	Low-Risk					Si Saket	Khun Han	Northeastern	Low-Risk	Chachoengsao	Bang Pakong	Eastern	Low-Risk	
Chachoengsao	Bang Pakong	Eastern	Low-Risk					Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	Chachoengsao	Bang Nam Pieo	Eastern	Low-Risk	
Chachoengsao	Muang Chachoengsao	Eastern	Low-Risk					Chachoengsao	Bang Pakong	Eastern	Low-Risk	Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	
Chachoengsao	Bang Nam Pieo	Eastern	Low-Risk					Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	Chachoengsao	Bang Nam Pieo	Eastern	Low-Risk	
Bangkok	Bangkok	Central	Low-Risk					Bangkok	Bangkok	Central	Low-Risk	Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	
Chachoengsao	Muang Chachoengsao	Eastern	Low-Risk					Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	Chachoengsao	Bang Pakong	Eastern	Low-Risk	
Chachoengsao	Muang Chachoengsao	Eastern	Low-Risk					Chachoengsao	Bang Pakong	Eastern	Low-Risk	Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	
Chachoengsao	Muang Chachoengsao	Eastern	Low-Risk					Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	Chachoengsao	Bang Pakong	Eastern	Low-Risk	
Nonthaburi	Bang Bua Thong	Central	Low-Risk					Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	Chachoengsao	Bang Pakong	Eastern	Low-Risk	
								Chachoengsao	Bang Pakong	Eastern	Low-Risk	Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	
								Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	Chachoengsao	Bang Pakong	Eastern	Low-Risk	
								Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	
								Nonthaburi	Sai Noi	Central	Low-Risk	Chachoengsao	Muang Chachoeng	Eastern	Low-Risk	
								Nonthaburi	Bang Bua Thong	Central	Low-Risk	Chachoengsao	Bang Pakong	Eastern	Low-Risk	

 Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Lao PDR														
Date of FFG products 05/09/2021 00:00 UTC time														
01-Hour Flash Flood Risk and Location					03-Hour Flash Flood Risk and Location					06-Hour Flash Flood Risk and Location				
Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk
Bolikhamway	Pakxanh	XAYSAVANG	Central Laos	Low-Risk	Bolikhamway	Pakxanh	XAYSAVANG	Central Laos	Low-Risk	Bolikhamway	Pakxanh	XAYSAVANG	Central Laos	Low-Risk
										Bolikhamway	Thaphabat	HOUAYGNAI	Central Laos	Low-Risk
										Vientiane	Thoulakho	NAM ANG	Northwest	Low-Risk
										Sekong	Dakcheung	DAKVANG	Southeast	Low-Risk



Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Viet Nam

Date of FFG products 05/09/2021 00:00 UTC time											
01-Hour Flash Flood Risk and Location				3-Hour Flash Flood Risk and Location in Vietnam				6-Hour Flash Flood Risk and Location in Vietnam			
Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks
Gia Lai	Duc Co	Central Highlands	Low-Risk	Gia Lai	Duc Co	Central Highlands	Low-Risk	Kon Tum	Sa Thay	Central Highlands	Low-Risk
Gia Lai	Chu Prong	Central Highlands	Low-Risk	Ba Ria Vung Tau	Xuyen Moc	Southeast	Low-Risk	Gia Lai	la Grai	Central Highlands	Low-Risk
Dak Lak	Dak Mil	Central Highlands	Low-Risk	Long An	Can Giuoc	Southeast-Mekong River Delta	Low-Risk	Gia Lai	Duc Co	Central Highlands	Low-Risk
Quang Nam	Phuoc Son	South Central Coast	Low-Risk	Dong Nai	Xuan Loc	Southeast	Low-Risk	Gia Lai	Chu Prong	Central Highlands	Low-Risk
Binh Thuan	Ham Tan	South Central Coast	Low-Risk	Dong Nai	Nhon Trach	Southeast	Low-Risk	Dak Lak	Dak Mil	Central Highlands	Low-Risk
Ba Ria Vung Tau	Xuyen Moc	Southeast	Low-Risk	Ba Ria Vung Tau	Xuyen Moc	Southeast	Low-Risk	Binh Phuoc	Loc Ninh	Southeast	Low-Risk
Long An	Can Giuoc	Southeast-Mekong River Delta	Low-Risk	Tay Ninh	Tan Bien	Southeast	Low-Risk	Quang Nam	Phuoc Son	South Central Coast	Low-Risk
Long An	Can Duoc	Southeast-Mekong River Delta	Low-Risk	Long An	Thu Thua	Southeast-Mekong River Delta	Low-Risk	Quang Nam	Tra My	South Central Coast	Low-Risk
Binh Phuoc	Phuoc Long	Southeast	Low-Risk	Lam Dong	Lam Ha	Central Highlands	Low-Risk	Gia Lai	Khang	Central Highlands	Low-Risk
Dong Nai	Long Khanh	Southeast	Low-Risk	Lam Dong	Lac Duong	Central Highlands	Low-Risk	Binh Thuan	Ham Tan	South Central Coast	Low-Risk
Dong Nai	Xuan Loc	Southeast	Moderate-Risk	Tien Giang	Chau Thanh	Southeast-Mekong River Delta	Low-Risk	Ba Ria Vung Tau	Xuyen Moc	Southeast	Low-Risk
Dong Nai	Nhon Trach	Southeast	Low-Risk	Tien Giang	Cho gao	Southeast-Mekong River Delta	Low-Risk	Long An	Can Giuoc	Southeast-Mekong River Delta	Low-Risk
Ba Ria Vung Tau	Xuyen Moc	Southeast	Low-Risk					Ho Chi Minh	Quan 8	Southeast	Low-Risk
Ba Ria Vung Tau	Long Dat	Southeast	Low-Risk					Long An	Can Duoc	Southeast-Mekong River Delta	Low-Risk
Long An	Tan Tru	Southeast-Mekong River Delta	Low-Risk					Binh Phuoc	Phuoc Long	Southeast	Low-Risk
Tien Giang	Chau Thanh	Southeast-Mekong River Delta	Low-Risk					Dong Nai	Long Khanh	Southeast	Low-Risk
Tay Ninh	Tan Bien	Southeast	Low-Risk					Dong Nai	Xuan Loc	Southeast	Low-Risk
Binh Phuoc	Binh Long	Southeast	Low-Risk					Dong Nai	Nhon Trach	Southeast	Low-Risk
Long An	Thu Thua	Southeast-Mekong River Delta	Low-Risk					Ba Ria Vung Tau	Xuyen Moc	Southeast	Low-Risk
Lam Dong	Lam Ha	Central Highlands	Low-Risk					Ba Ria Vung Tau	Long Dat	Southeast	Low-Risk
Lam Dong	Lac Duong	Central Highlands	Low-Risk					Long An	Tan Tru	Southeast-Mekong River Delta	Low-Risk
Tien Giang	Cai Be	Southeast-Mekong River Delta	Low-Risk					Tien Giang	Chau Thanh	Southeast-Mekong River Delta	Low-Risk
Tien Giang	Chau Thanh	Southeast-Mekong River Delta	Low-Risk					Tay Ninh	Tan Bien	Southeast	Low-Risk
Tien Giang	Cho gao	Southeast-Mekong River Delta	Low-Risk					Binh Phuoc	Binh Long	Southeast	Low-Risk
Tien Giang	TP. My Tho	Southeast-Mekong River Delta	Low-Risk					Tay Ninh	TX Tay Ninh	Southeast	Low-Risk
								Long An	Thu Thua	Southeast-Mekong River Delta	Low-Risk
								Tien Giang	Tan Phuoc	Southeast-Mekong River Delta	Low-Risk
								Tien Giang	Cai Be	Southeast-Mekong River Delta	Low-Risk

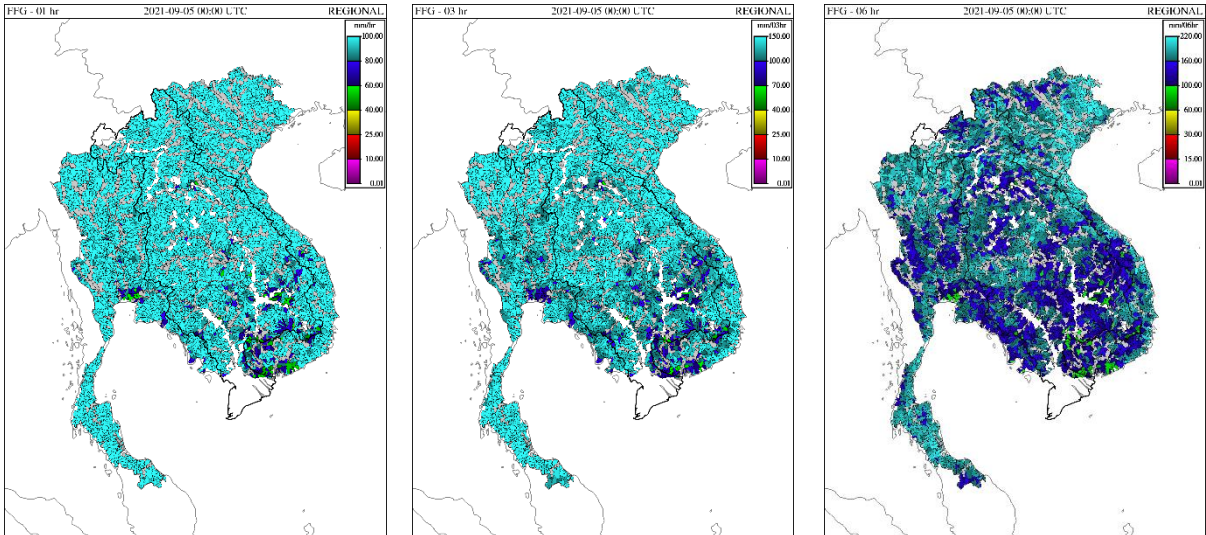


Figure 14. Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on August 26.

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from 28 August to 03 September 2021

Drought monitoring data for 2021 are available from Saturday to Friday every week; thus, the reporting period is normally delayed by three days compared to Flood and Flash Flood reports. We adopt the Index of Soil Water Fraction (ISWF) data obtained from FFGS to represent soil moisture of agricultural indicator for both dry and wet seasons.

- **Weekly Standardised Precipitation Index (SPI1)**

Meteorological indicator of SPI from August 28 to September 3, as shown in [Figure 15](#), shows that the LMB was experiencing some moderate and severe meteorological droughts in the upper and middle parts. Specifically, droughts covered Chiang Mai, Chiang Rai, Udon Thani, Sakon Nakhon, Kalasin, Nakhon Phanom, Nakhon Ratchasima, and Buriram of Thailand and Phongsaly, Luang Prabang, Xayaburi, Xieng Khuang, Xaysomboun, Borikhamxay, and Khammuane of Lao PDR. In the lower part, the LMB was normal and wet during the monitoring week.

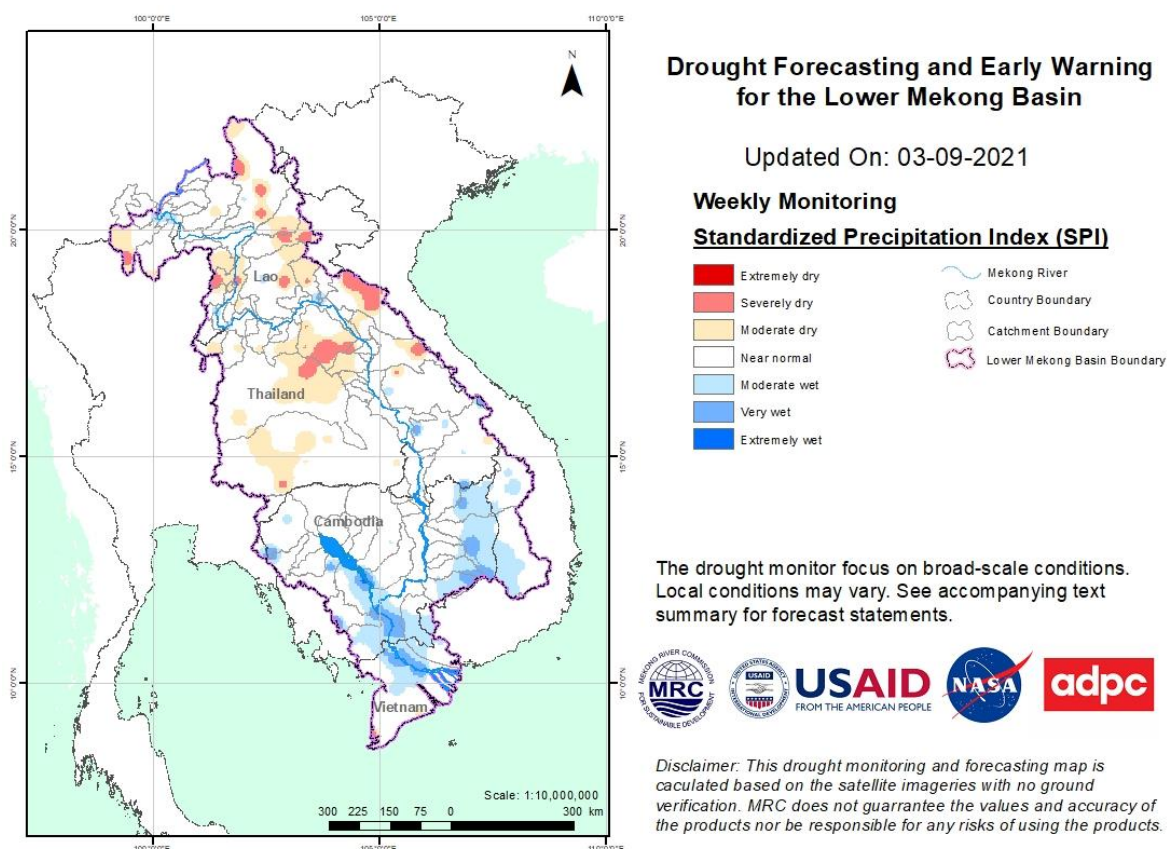


Figure 15. Weekly standardized precipitation index from 27 Aug to 03 September 2021.

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

Soil water fraction from August 27 to September 3, as displayed in [Figure 16](#), was very much similar to the conditions last week from August 21 to 27. It shows that the LMB region was relatively wet in the south and dry in Savannakhet, Khammuane, Borikhamxay, Xieng Khuang, Xaysomboun, Luang Prabang, and Phongsaly of Lao PDR and Sakon Nakhon, Nakhon Phanom, Mukdahan, Roi Et, and Ubon Ratchathani of Thailand with moderate and severe conditions.

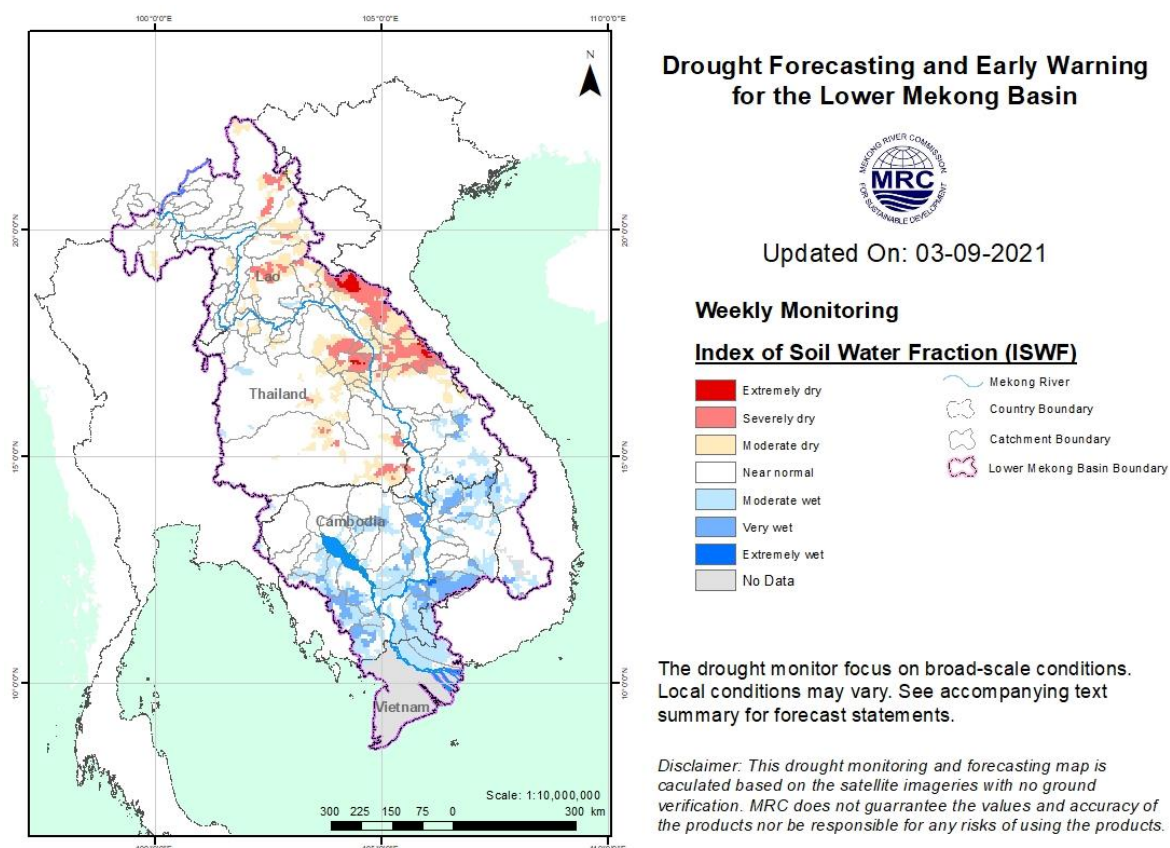


Figure 16. Weekly Soil Moisture Anomaly from 27 Aug to 03 September 2021.

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

The overall drought conditions from Aug 28 to September 3 were relatively similar to the week from August 21 to 27, as displayed in [Figure 17](#). However, this week CDI was more critical than last week which showed some drought threat in eastern part of the region covering Borikhamxay and Khammuane of Lao PDR and Sakon Nakhon and Nakhon Phanom of Thailand with severe level. Some other locations in the north were also hit by moderate drought including Phongsaly, Luang Prabang, Xieng Khuang, Xaysomboun, Kalasin, Mukdahan and Savannakhet. However, the condition was not serious.

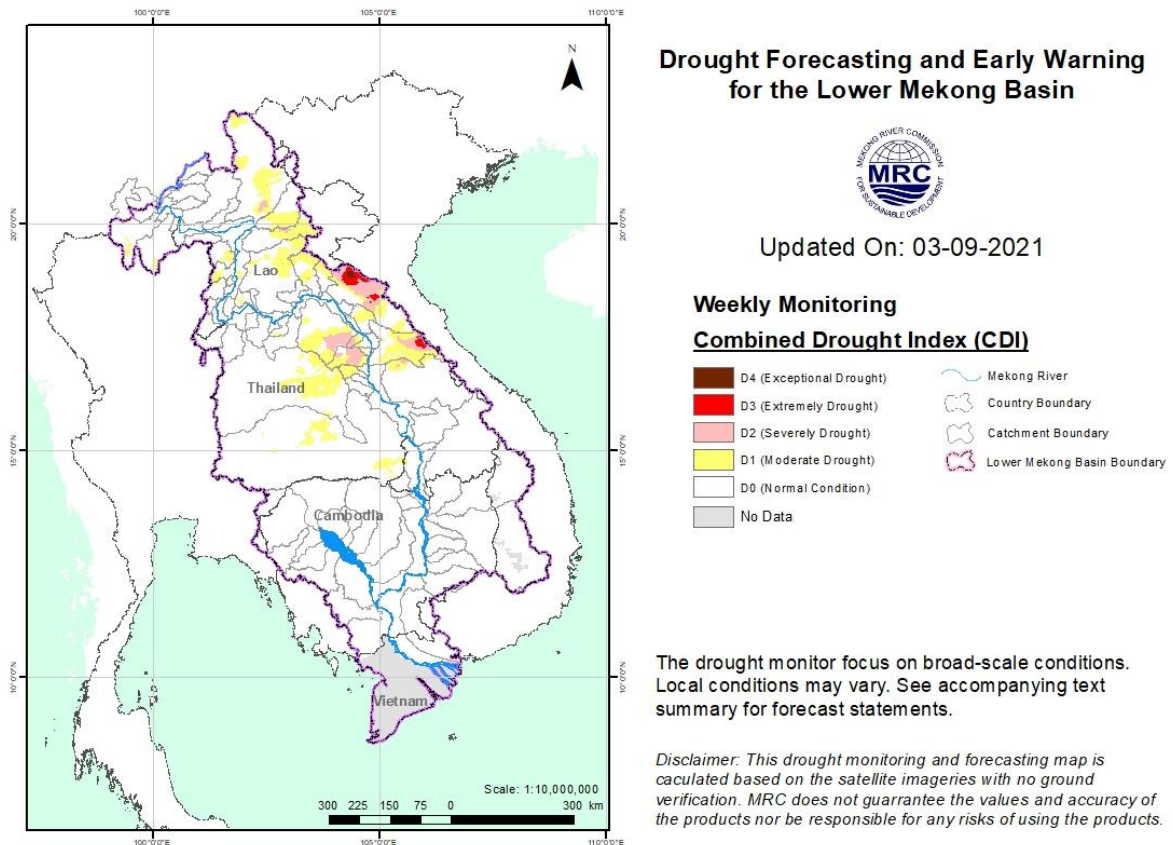


Figure 17. Weekly Combined Drought Index from 27 Aug to 03 September 2021.

More information on Drought Forecasting and Early Warning (DFEW) as well as the explanation is available here: <http://droughtforecast.mrcmekong.org/templates/view/our-product>. DFEW provides not only weekly monitoring and forecasting information but also a three-month forecast of drought indicators with seasonal outlook which are updated every month based on international weather forecast models. Details on drought forecast are described in section [6.4](#) of this report.

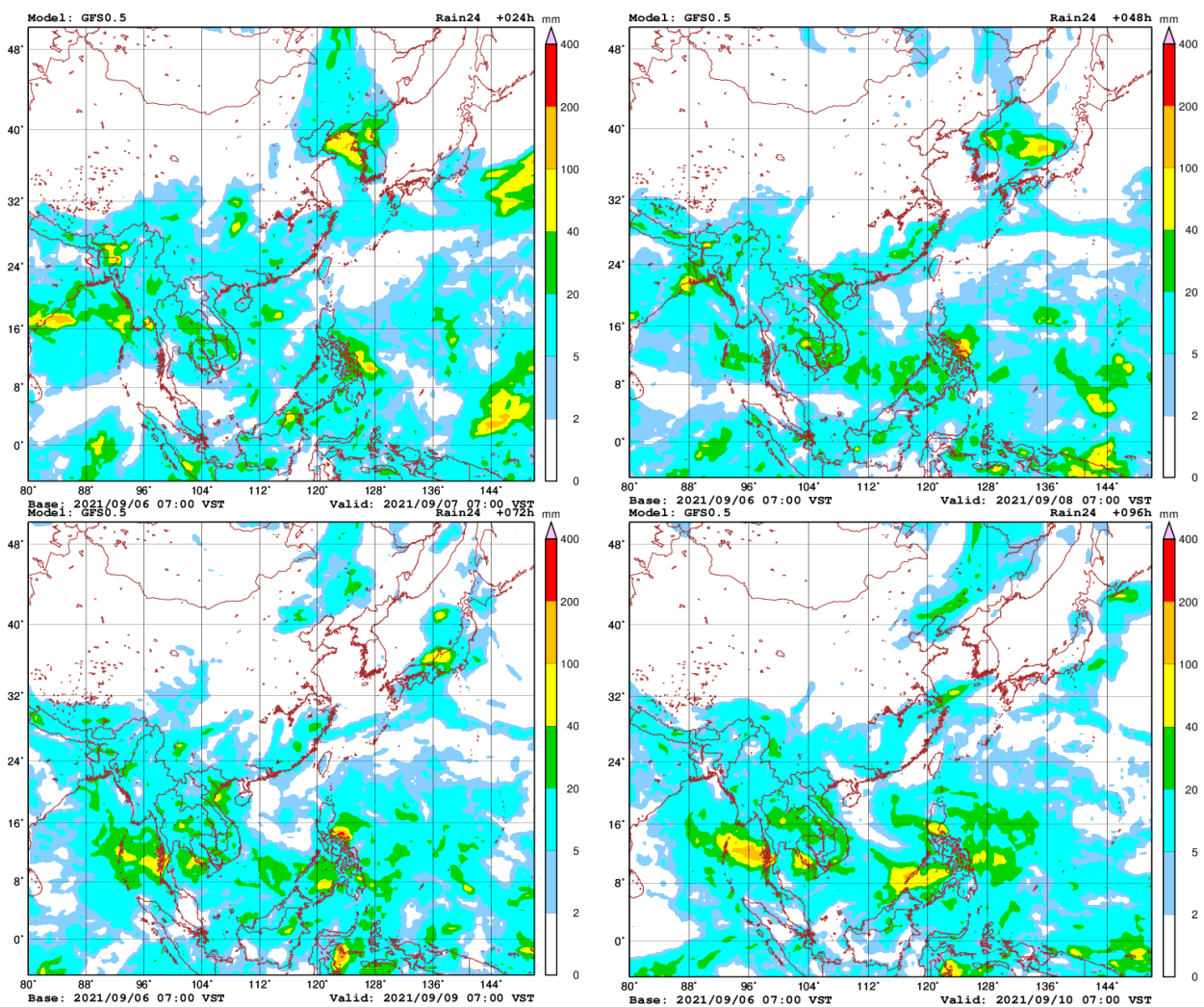
6 Weather and Water Level Forecast and Flash Flood Information

6.1 Weather and rainfall forecast

Based on the analysis of the synoptic meteorological information and result from the Global Forecast System (GFS) model, in the coming week, the southwest monsoon and low-pressure cell will continue prevailing over the LMB.

From September 8 to 13, heavy rainfall (50 – 100 mm/24h) and moderate rainfall (20 – 50 mm/24h) will likely occur in some areas from upper to lower part of the LMB.

[Figure 18](#) shows accumulated rainfall forecast (24 h) of the GFS model from September 7-13.



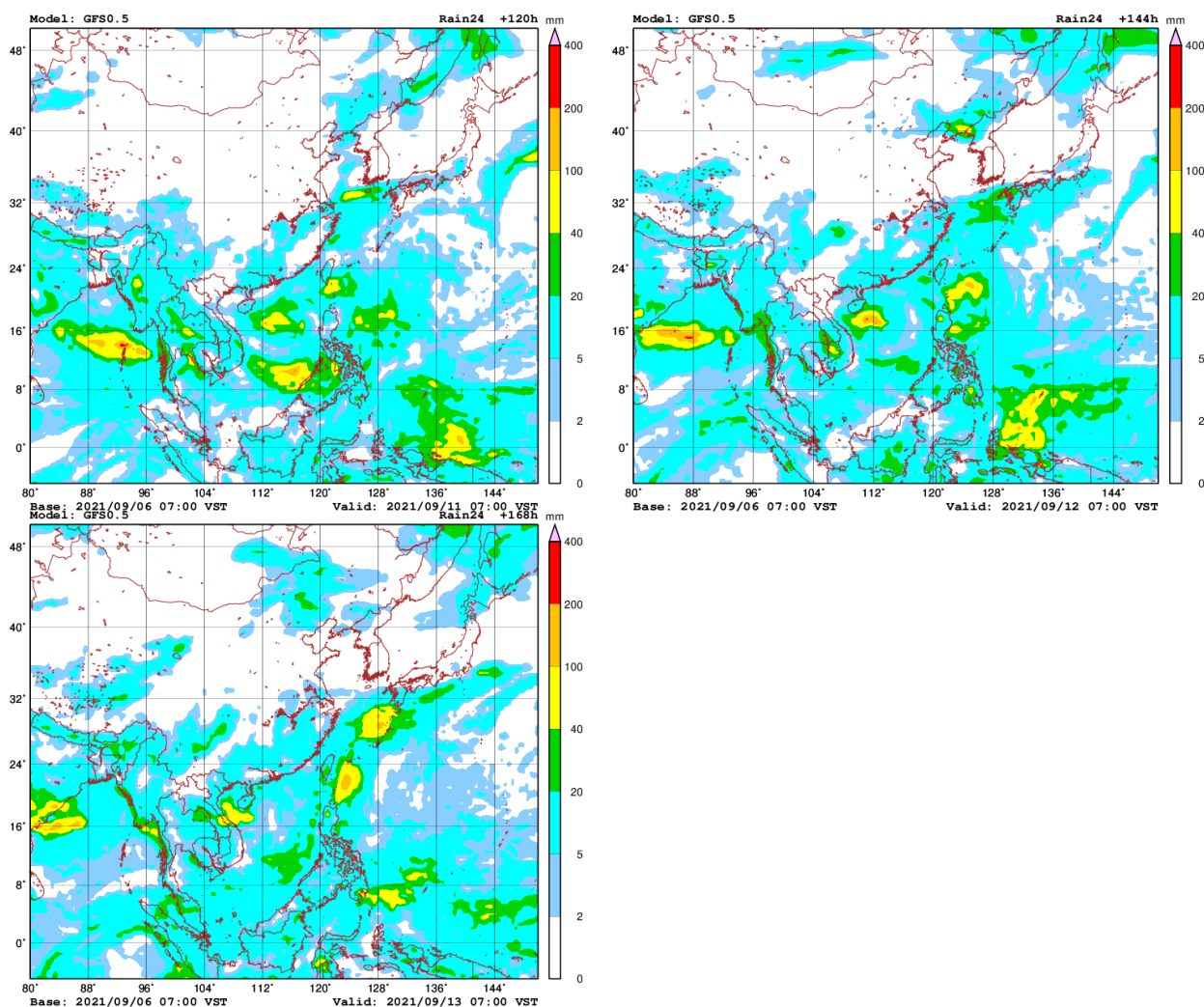


Figure 18. Accumulated rainfall forecast (24 h) based on a GFS model.

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on September 6's daily flood forecasting bulletin, the daily forecasted water level at Chiang Saen in Thailand is expected to increase from 3.20 m to 3.85 m over the next five days. The trend will keep the water level at this station below its LTA.

For Luang Prabang in Lao PDR, the water level will increase from 10.24 m to 11.00 m during the next five days. The current water level is lower than its LTA. Precipitation is forecasted for the area between Chiang Saen and Luang Prabang next week.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand is forecasted to rise about 0.55 m, while water level at Vientiane in Lao PDR will also increase about 0.50 m. Furthermore, from Nong Khai in Thailand, the water level will increase about 0.70 m over the next five days and at Paksane in Lao PDR water level will increase about 0.80 m due to some forecasted rainfall in the upper catchments. Rainfall is forecasted for the area of Paksane next week.

The water levels at these stations will go up but still stay lower than their LTA.

Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR are forecasted to increase between 0.10 m and 0.60 m over the next five days. The water levels at these stations will stay higher than their minimum level. Rainfall is forecasted for the area of stations, next week

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

From Stung Treng to Kampong Cham along the Mekong River in Cambodia, the water levels will go up from 0.50 m to 1.00 m over the next five days. Precipitation is forecasted for the area between Stung Treng and Kampong Cham during next week.

The water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port as well as at Phnom Penh's Chaktomuk on the Bassac River will increase by about 0.45 m over the next five days.

Water levels at most of the stations will continue to stay lower than their LTA value, particularly in the lower part of the region from the Bassac at Phnom Penh to Koh Khel as well as from Tonle Sap at Prek Kdam to Phnom Penh Port, including the Tonle Sap Lake. Precipitation is forecasted for the low-lying area of Cambodia next week.

Tidal stations at Tan Chau and Chau Doc

For Viet Nam's Tan Chau on the Mekong River and Chau Doc on the Bassac River, the water levels will be fluctuating above their minimum level, following daily tidal effects from the sea. Rainfall is forecasted for the Delta area next week.

The performance of the weekly flood forecast, with an accuracy and data input evaluation from 31 August to 6 September 2021, is presented in **Annex 1**.

[Table 2](#) shows the daily flood forecasting Bulletin issued on September 6. Results of the weekly river monitoring bulletin are also available at http://ffw.mrcmekong.org/bulletin_wet.php.

6.3 Flash Flood Information

With moderate and heavy rainfall forecasted for next week, flash floods with high level are expected to take place in the LMB. And local heavy rain in a short period of time is possible with unexpected short flash floods. The information on flash flood guidance for the next one, three, and six hours is updated twice a day at: <http://ffw.mrcmekong.org/ffg.php>.

Detailed information on Flash Flood Warning Information as well as on its explanation is available for download [here](#).

6.4 Drought forecast

There are several climate-prediction models with different scenarios on the upcoming months until November 2021. The MRC's DFEWS adopts an ensemble model called the North America Multi-Model Ensemble (NMME), which averages all scenarios.

The global scale of rainfall prediction is used to see how the rain distribution looks like for the coming months. [Figure 18](#) shows the ensemble mean of daily average precipitation (mm/day) each month from September to November 2021 produced by the NMME.

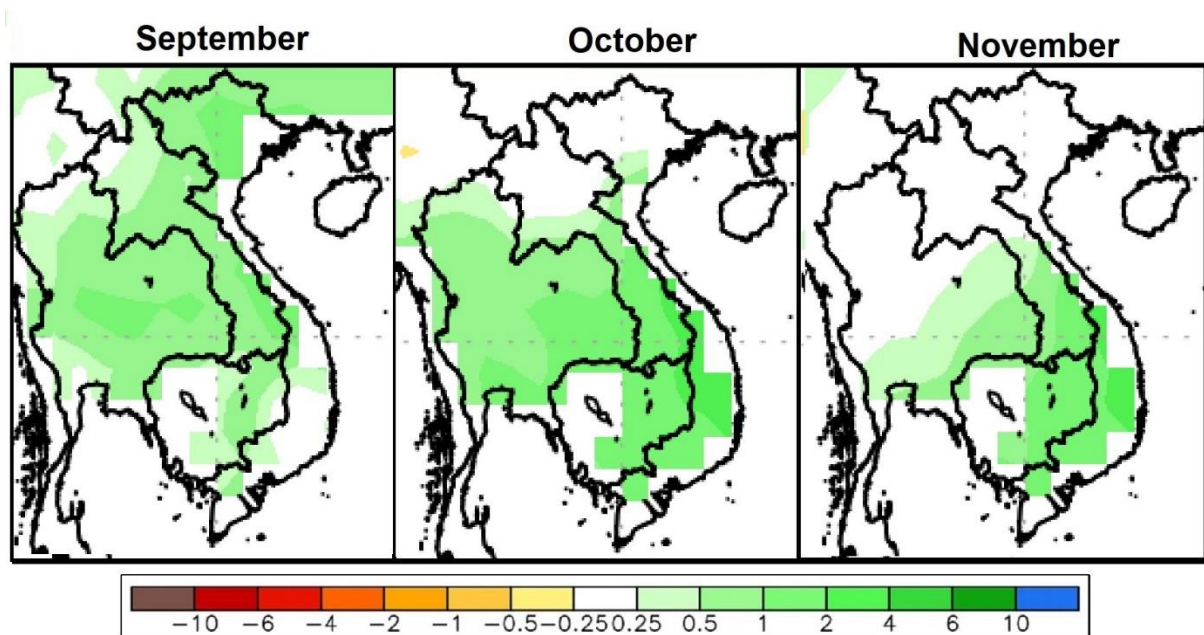


Figure 19. Daily average of monthly rainfall anomaly forecast from August to November 2021.

The ensemble prediction model based on the initial conditions in August reveals that the LMB is likely to receive above average rainfall in September and October mainly in the central and southern parts of the region. Like 2020, the forecast shows that October is likely the wettest month of the year. November is forecasted to receive from average to above average rainfall throughout the LMB.

The 2021 dry season is relatively wetter than that of 2020 and the monsoon rain in the 2021 wet season has arrived earlier than it did in 2019 and 2020 especially over the upper and central parts of the LMB.

Table 2. Weekly River Monitoring Bulletin.



Mekong Bulletin

Mekong River Commission Secretariat (MRCS)
 Regional Flood and Drought Management Centre (RFDMC)
 P.O. Box 623 #576, National Road #2, Chak Angre Krom, Meanchey, Phnom Penh, Cambodia
 Tel: (855-23) 425353, Fax: (855-23) 425363, Email: floodforecast@mrcmekong.org

River Flood Forecast: 07 September - 11 September 2021

Date: 06 September 2021

Location	Country	24-hr Observed Rainfall (mm)	Zero gauge above M.S.L (m)	Flood level (m)	Alarm level (m)	Observed W. level against zero gauge (m)		Forecasted Water Levels (m)					There is currently no flood warning in place at monitoring sites on the Mekong										
						05-Sep	06-Sep	07-Sep	08-Sep	09-Sep	10-Sep	11-Sep	06	07	08	09	10	11					
Jinghong		0.5				535.60	535.63										X	X	X	X	X	X	
Chiang Saen		6.3	357.110	12.80	11.50	3.13	3.22	3.35	3.53	3.63	3.73	3.85		↑	↑								
Luang Prabang		35.8	267.195	18.00	17.50	10.16	10.24	10.40	10.67	10.88	11.20	11.40		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Chiang Khan		4.8	194.118	16.00	14.50	8.16	7.91	7.97	8.08	8.21	8.40	8.56	↓		↑	↑	↑	↑	↑	↑	↑	↑	↑
Vientiane		1.8	158.040	12.50	11.50	5.31	5.28	5.20	5.28	5.41	5.56	5.77				↑	↑	↑	↑	↑	↑	↑	↑
Nongkhal		3.3	153.648	12.20	11.40	5.25	5.31	5.35	5.50	5.67	5.85	6.10			↑	↑	↑	↑	↑	↑	↑	↑	↑
Paksane		4.5	142.125	14.50	13.50	6.74	6.81	7.00	7.13	7.33	7.50	7.65		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Nakhon Phanom		15.2	130.961	12.00	11.50	5.67	5.74	5.81	6.00	6.10	6.26	6.40				↑	↑	↑	↑	↑	↑	↑	↑
Thakhek		10.5	129.629	14.00	13.00	6.81	6.90	7.00	7.21	7.41	7.59	7.75				↑	↑	↑	↑	↑	↑	↑	↑
Mukdahan		8.1	124.219	12.50	12.00	5.45	5.55	5.63	5.71	5.90	6.07	6.23				↑	↑	↑	↑	↑	↑	↑	↑
Savannakhet		21.2	125.410	13.00	12.00	3.20	3.20	3.25	3.30	3.45	3.58	3.70				↑	↑	↑	↑	↑	↑	↑	↑
Khong Chiam		1.0	89.030	14.50	13.50	6.15	6.31	6.45	6.57	6.70	6.93	7.13		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Pakse		nr	86.490	12.00	11.00	4.72	4.62	4.70	4.80	4.90	5.08	5.25	↓	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Stung Treng		94.5	36.790	12.00	10.70	5.59	5.85	6.15	6.30	6.43	6.53	6.68		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Kratie		15.0	-0.101	23.00	22.00	13.94	13.95	14.31	14.65	14.82	14.97	15.10		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Kompong Cham		2.3	-0.930	16.20	15.20	8.12	8.17	8.26	8.65	9.02	9.22	9.40		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Phnom Penh (Bassac)		1.0	-1.020	12.00	10.50	4.83	4.92	4.98	5.10	5.25	5.35	5.44		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Phnom Penh Port		-	0.070	11.00	9.50	3.85	3.93	3.98	4.10	4.25	4.35	4.45		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Koh Khei (Bassac)		7.6	-1.000	8.40	7.90	4.47	4.56	4.60	4.70	4.80	4.88	4.95		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Neak Luong		11.8	-0.330	8.00	7.50	3.26	3.36	3.43	3.49	3.64	3.78	3.89		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Prek Kdam		6.2	0.080	10.00	9.50	3.94	4.03	4.09	4.21	4.33	4.41	4.51		↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Tan Chau		7.1	0.000	4.50	3.50	1.61	1.55	1.48	1.33	1.18	1.05	0.95		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Chau Doc		33.4	0.000	4.00	3.00	1.64	1.59	1.51	1.35	1.20	1.10	1.00		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓

REMARKS:

-: not available.
nr: no rain.

LEGEND		
rising water level		↑
stable water level		↔
falling water level		↓
alarm stage		Yellow background
alarm situation		Orange background
flood stage		Red background
no data available		X

Note: Stable water level is defined as a daily change of less than 10cm from Chiang Saen to Savannakhet; less than 5cm at Pakse and Stung Treng; and no more than 3cm cm from Kratie downstream.
Flood stage is when the flood level exceeds. A flood level is determined by each Member Country.
Alarm stage is when the water level ranges between alarm and flood levels.
Alarm situation is when the water level is forecasted to reach the flood stage within the next three days.

River Flood Forecaster *K. Sothea*
KHEM Sothea

NOTE: Discharge at Luang Prabang may be influenced by hydropower operations (at both upstream and downstream).
 For more info, please refer to this link:
<http://www.mrcmekong.org/>; http://ffw.mrcmekong.org/bulletin_wet.php; <http://ffw.mrcmekong.org/reportflood.php>

7 Summary and Possible Implications

7.1 Rainfall and its forecast

Rain was observed from Chiang Saen in Thailand to Pakse in Lao PDR during August 31-September 6, including the lower part in Cambodia and Viet Nam, varying from 8.40 mm to 275.50 mm, and considered high compared with last week.

Based on the forecasted satellite data, rainfall is forecasted for some areas of the LMB with value ranging from 30 mm to 150 mm for the next seven days. The forecasting model using GFS data, moreover, shows that significant rainfall (<100 mm) is likely to take place in the Mekong region from 07-12 September 2021.

7.2 Water level and its forecast

According to MRC's observed water level data, the outflows at Jinghong hydrological station showed slightly increase over the monitoring period from 31 August to 6 September 2021. It was up about 0.03 m from 535.60 m on August 31 to 535.63 m on September 6. The outflows increased from 1,050 m³/s on August 31 to 1,071 m³/s on September 6, 2021.

Amid the significant low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Thakhek in Lao PDR increased during August 31- September 6 due to above-average rainfall in the LMB. However, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR were staying close to their historical minimum level. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia, moreover, followed the same trend of the upstream ones and stayed close to their minimum level.

Over the next few days, the water levels from Chiang Khan to Vientiane and from Nakhon Phanom to Pakse are expected to increase by about 0.55 m.

The flow volume of the Tonle Sap Lake is lower than its LTA. From next week, the flow is expected to increase due to the forecasted rainfall in the inflow catchments of the Tonle Sap Lake.

From Stung Treng to Kampong Cham, the water levels will continue staying below their LTA. The water levels – at Neak Luong on the Mekong River, from Prek Kdam to Phnom Penh Port on the Tonle Sap, and from Chaktomuk to Koh Khel on the Bassac – are forecasted to remain lower than their LTA.

The situation in Tan Chau on the Mekong River and Chau Doc on the Bassac River is expected to remain unchanged.

Since the fourth week of July 2021, water levels across most monitoring stations in the LMB have significantly dropped to the level lower than their LTA (from upper to lower stretches within the LMB) but are likely to start rising by the 3rd week of August based on the predicted

rainfall from satellite. For a more complete preliminary analysis of the hydrological conditions in the LMB over July–December 2020 and November 2020 to May 2021 see this [Situation Report](#).

The contribution to the Mekong River’s flow from the UMB in China (Yunnan component) is about 16% by the time the river discharges through the Mekong Delta into the Sea. By far the major contribution comes from the two major ‘left-bank’ (Eastern) tributaries between Vientiane – Nakhon Phanom and Pakse – Stung Treng, which together contribute more than 40% of the flows.

7.3 Flash flood and its trends

With the predicted amount of rainfall for the coming week as mentioned earlier in [section 6.1](#), the major flash floods are expected in the LMB during next week. And local heavy rain in a short period of time is possible with unexpected short flash floods.

7.4 Drought condition and its forecast

The overall drought conditions from Aug 28 to September 3 showed some drought threat in eastern part of the region covering Borikhamxay and Khammuane of Lao PDR and Sakon Nakhon and Nakhon Phanom of Thailand with severe level. Some other locations in the north were also hit by moderate drought including Phongsaly, Luang Prabang, Xieng Khuang, Xaysomboun, Kalasin, Mukdahan and Savannakhet. However, the condition was not serious.

For the upcoming three-month forecast, the LMB is likely to receive above average rainfall in September and October mainly in the central and southern parts of the region. Like 2020, the forecast shows that October is likely the wettest month of the year. November is forecasted to receive from average to above average rainfall throughout the LMB.

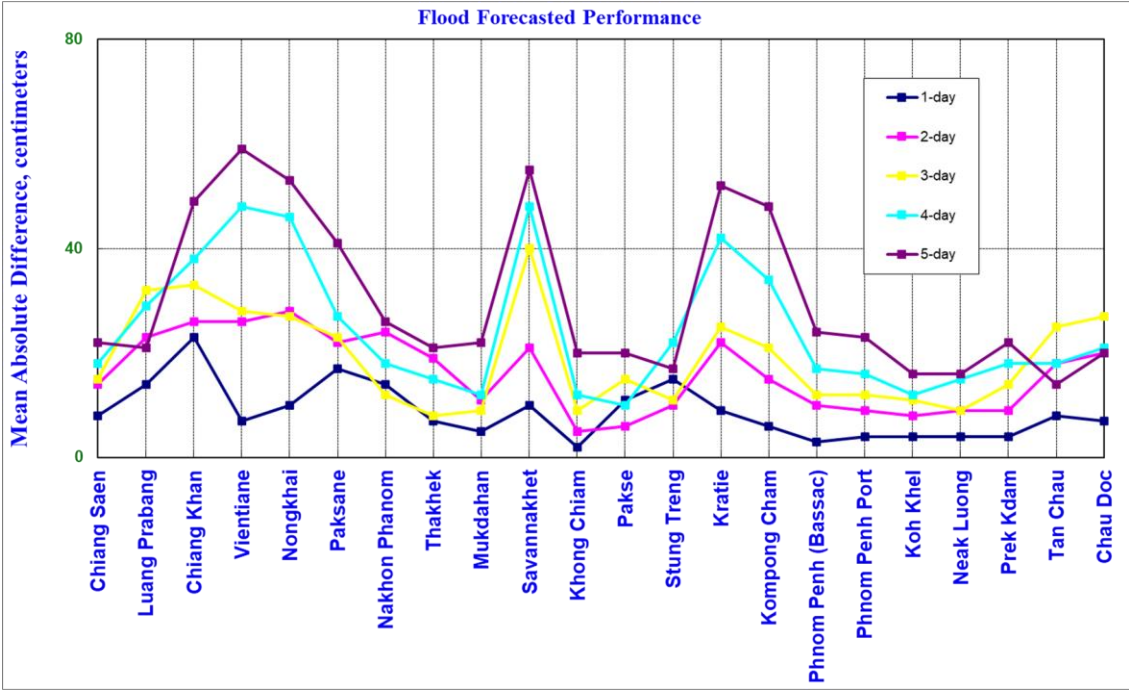
Annex 1: Performance of the weekly flood forecasting

Accuracy

“Accuracy” here refers to the state where data recorded in the MRC’s Mekong River Flood Forecasting System are cleaned and verified.

The adjustment of flood forecasting outcomes from the flood forecasting system requires flood forecasters to have extensive knowledge in hydrology and statistical modelling for estimating the relationships between stations upstream and downstream in the Mekong River Basin. Flood forecasting performance presented in the graph below shows the average flood forecasting accuracy at each key station along the Mekong mainstream from 31 August to 6 September 2021.

The forecasting values from 31 August to 6 September show that the overall accuracy is fair for a one-day to three-day forecast in lead time at stations in the middle to the lower parts of the Mekong River from Luang Prabang to Khong Chiam due to the effect of heavy rainfall and dams operation in this area during the report period.



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

- Missing rainfall in Cambodia (DOM) data and data input are not sufficient to be used for inputting into the flood forecasting model system.
- The influence of heavy rainfall caused by storms and hydropower operations from upstream, tributaries inflows and the lower part of the Mekong floodplain.
- Luang Prabang, Chiang Khan, Paksane and Savannakhet stations have been affected by hydropower operations of Xayaburi and Nam Nguem (water retention and release). Rainfall always accumulates at this spot, which could be causing rapidly high-water

levels.

- Rapid fluctuations of the water levels at Tan Chau and Chau Doc stations due to daily tidal effects of the sea in the Mekong Delta.
- Satellite rainfall data was not representative of the actual rainfall at ground stations in some areas of the Mekong region.

Performance based on data from the Member Countries

Flood forecasting performance is based on the hydro-met data received from the Member Countries. The flood forecasting achievement indicated in (%) and (cm) from 1 day to 5 days at each key station, against with Old Benchmark are presented in Table B1 and Table B2.

The evaluation of performance indicators, missing data and completion time for flood forecasting are presented in Table B3 and Figures B4, B5 and B6, respectively from 31 August to 6 September, 2021.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 31 August to 6 September, 2021 in cm

Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	8	14	<u>23</u>	7	10	17	14	7	5	10	2	11	15	9	6	3	4	4	4	4	8	7
2-day	14	<u>23</u>	<u>26</u>	<u>26</u>	<u>28</u>	<u>22</u>	<u>24</u>	19	11	<u>21</u>	5	6	10	<u>22</u>	15	10	9	8	9	9	18	<u>20</u>
3-day	15	<u>32</u>	<u>33</u>	<u>28</u>	<u>27</u>	<u>23</u>	12	8	9	<u>40</u>	9	15	11	<u>25</u>	<u>21</u>	12	12	11	9	14	<u>25</u>	<u>27</u>
4-day	18	<u>29</u>	<u>38</u>	<u>48</u>	<u>46</u>	<u>27</u>	18	15	12	<u>48</u>	12	10	<u>22</u>	<u>42</u>	<u>34</u>	17	16	12	15	18	18	<u>21</u>
5-day	<u>22</u>	<u>21</u>	<u>49</u>	59	53	<u>41</u>	<u>26</u>	<u>21</u>	<u>22</u>	55	<u>20</u>	<u>20</u>	17	52	<u>48</u>	<u>24</u>	<u>23</u>	16	16	<u>22</u>	14	<u>20</u>

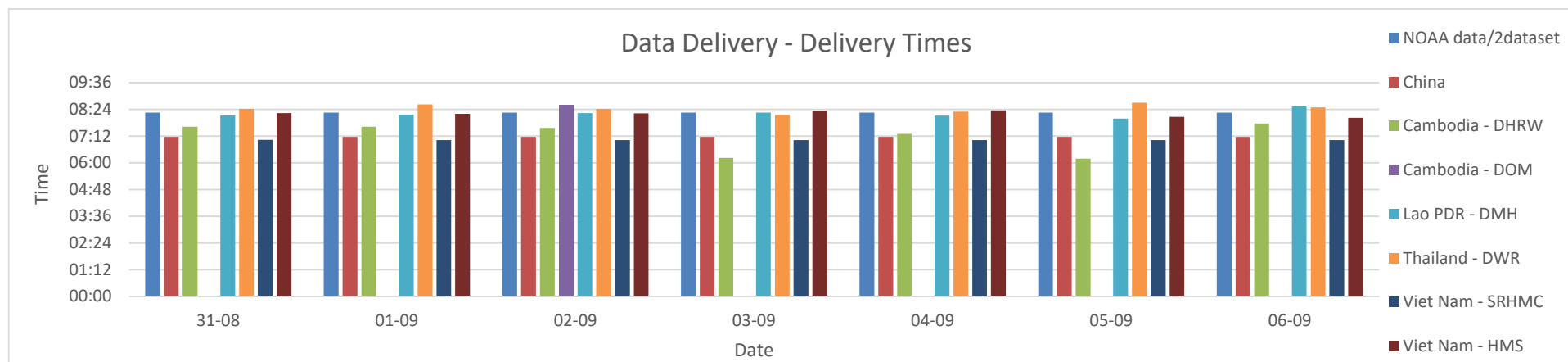
Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 31 August to 6 September, 2021 in %

Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	Average
1-day	57.1	71.4	57.1	<u>42.9</u>	71.4	<u>42.9</u>	71.4	57.1	57.1	71.4	71.4	71.4	<u>42.9</u>	71.4	71.4	57.1	71.4	71.4	<u>42.9</u>	85.7	71.4	71.4	63.6
2-day	<u>50.0</u>	<u>50.0</u>	66.7	<u>50.0</u>	<u>33.3</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>33.3</u>	<u>50.0</u>	<u>50.0</u>	66.7	66.7	66.7	<u>50.0</u>	<u>50.0</u>	66.7	66.7	<u>33.3</u>	<u>50.0</u>	<u>50.0</u>	52.3
3-day	60.0	60.0	60.0	80.0	<u>40.0</u>	60.0	<u>40.0</u>	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	<u>40.0</u>	60.0	<u>40.0</u>	60.0	<u>40.0</u>	56.4
4-day	<u>50.0</u>	<u>50.0</u>	75.0	75.0	<u>50.0</u>	<u>50.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	75.0	<u>50.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	55.7
5-day	<u>33.3</u>	<u>33.3</u>	66.7	66.7	<u>33.3</u>	66.7	<u>33.3</u>	66.7	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	66.7	66.7	66.7	66.7	66.7	66.7	<u>33.3</u>	66.7	66.7	<u>33.3</u>	51.5

Table B3: Overview of performance indicators for the past 7 days from 31 August to 6 September 2021

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)								
	FF completed and sent (time)	Stations without forecast	FF2 completed and sent (time)	Weather data available (time)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - SRHMC	Viet Nam - HMS	NOAA data/2dataset	China/2	Cambodia - DHRW/15	Cambodia - DOM/34	Lao PDR - DMH/32	Thailand - DWR/13	Viet Nam - SRHMC/6	Viet Nam - HMS/39	
2021																					
<i>week</i>	10:19	00:00	-	-	08:15	07:10	07:10	08:35	08:12	08:26	07:01	08:12	0	0	0	204	57	14	2	0	
<i>month</i>	10:30	00:00	-	-	08:15	07:10	07:21	08:36	08:26	08:14	07:17	08:11	0	0	14	272	334	48	7	38	

Fig. B4: Data delivery times for the past 7 days from 31 August to 6 September 2021



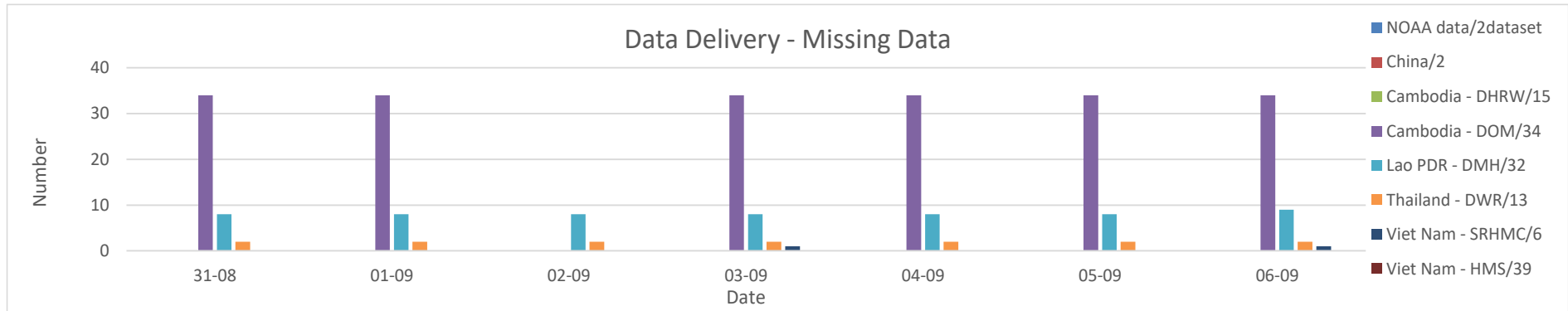


Fig. B5: Missing data for the past 7 days from 31 August to 6 September 2021

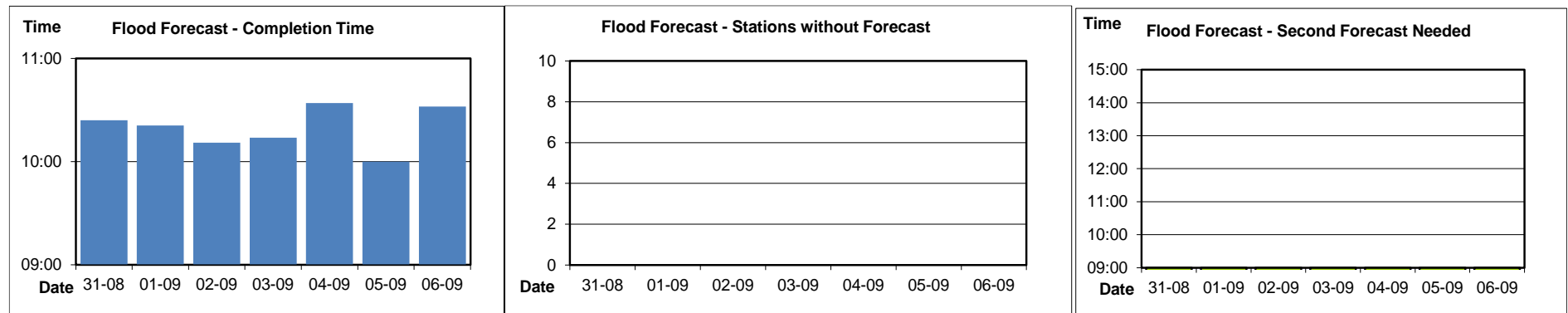


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 31 August to 6 September 2021



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