



**Mekong River Commission**

# **Weekly Wet Season Situation Report in the Lower Mekong River Basin 10-16 August 2021**

Prepared by  
The Regional Flood and Drought Management Centre  
17 August 2021

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## Key Messages

Key messages for this weekly report are presented below.

### Rainfall and its forecast

- Rainfall took place from Chiang Sean in Thailand to Pakse in Lao PDR, including the lower part in Cambodia and Viet Nam, varying from 10.20 millimetres (mm) to 261.00 mm.
- There will be some rainfalls for the next 5 days over the Mekong region from 17 to 23 August 2021 due to low-pressure dominating the Mekong region.

### Water level and its forecast

- The outflows at Jinghong hydrological station slightly increased over the monitoring period from 10 to 16 August 2021. It was up about 0.02 m from 535.25 metres (m) on August 10 to 535.27 m on August 16. The outflows increased from 818.00 cubic metres per second (m<sup>3</sup>/s) on August 10 to 832.00 m<sup>3</sup>/s on August 16.
- Amid the significantly low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Pakse in Lao PDR increased during August 10-16 but were still lower than their long-term averages. Similarly, water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia also went up following the same trend of the upstream ones.
- The water volume of the Tonle Sap Lake during this reporting period was slightly higher than that in 2019 and 2020 of the same period but was still lower than its LTA.
- Over the next few days, the water levels across most monitoring stations are expected to continue rising but still staying below their long-term value in most stations.

### Drought condition and its forecast

- From August 7 to 13, the LMB was still experiencing some moderate and severe droughts in overall conditions mainly in the central part of the region covering Roi Et, Maha Sarakham, Surin, Yasothon, and Amrat Charoen. In the lower part of the LMB, some areas of Dak Lak and Gia Lai were also experiencing some moderate and severe droughts.
- For the upcoming three-month forecast, the LMB is likely to receive much below average rainfall in August mainly in the central and southern parts of the region; September is forecasted to be extremely wet in the north, moderately wet and normal in the middle, and normal and moderately dry in southern areas 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 **10-16 August 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](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>

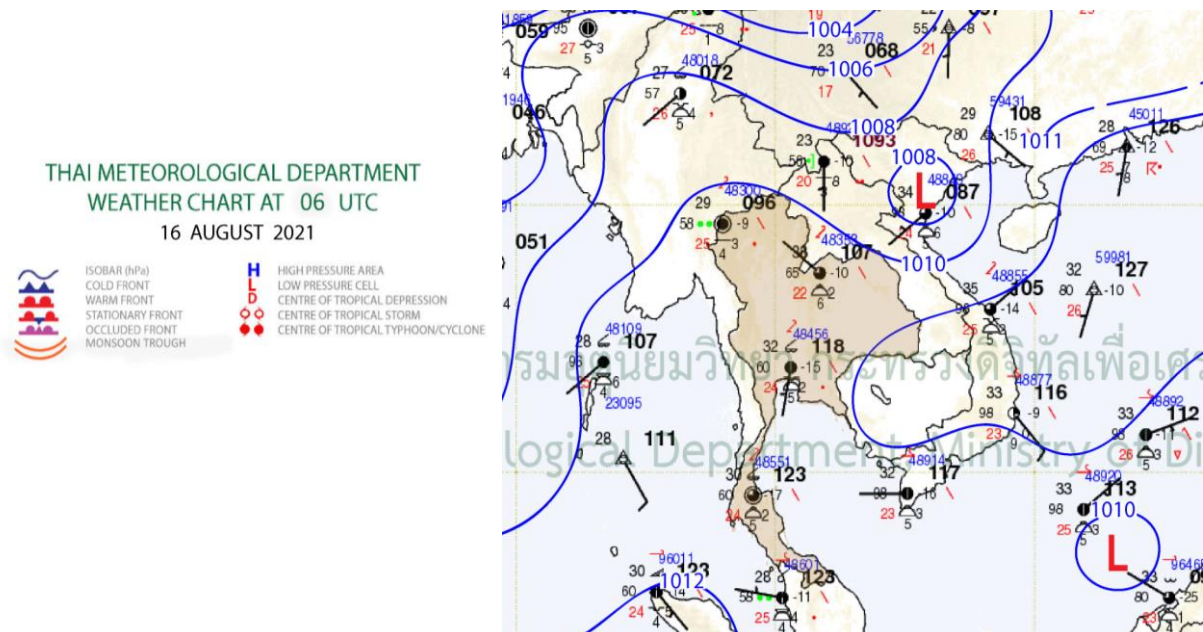


## 2 General Weather Patterns

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

The TMD stated that average rainfall will continue from August which is influenced by the Southwest Monsoon of the rainy season period. During this time, there will be more thunder rainstorms, wet-season thunderstorms, 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 August and September.

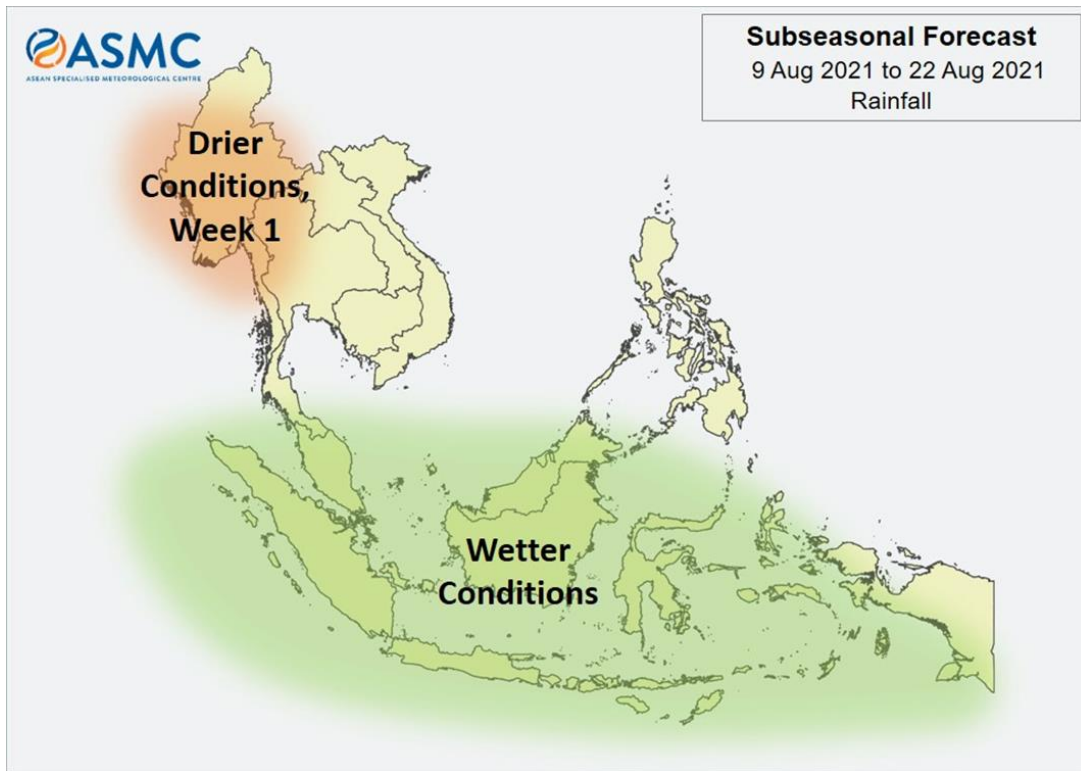
[Figure 1](#) presents the weather map of 16 August 2021, showing that a low pressure is dominating the upper part of Lao PDR and Viet Nam and might affect the 3S area (Sesan, Sre Pok, and Sekong) in Cambodia and Viet Nam of the LMB.



**Figure 1.** Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), a highest probability of drier condition is predicted over of the lower part of the Mekong region covering Lao PDR and Thailand from 9 to 22 August 2021, during the 1<sup>st</sup> and 2<sup>nd</sup> weeks of August. Nonetheless, Cambodia and Viet Nam are likely dominated by warm condition, which may receive average rainfall in general.

[Figure 2](#) shows the outlook of comparative warm conditions from 9 to 22 August 2021 covering the whole LMB region, based on results from the NCEP model (National Centres for Environmental Prediction).

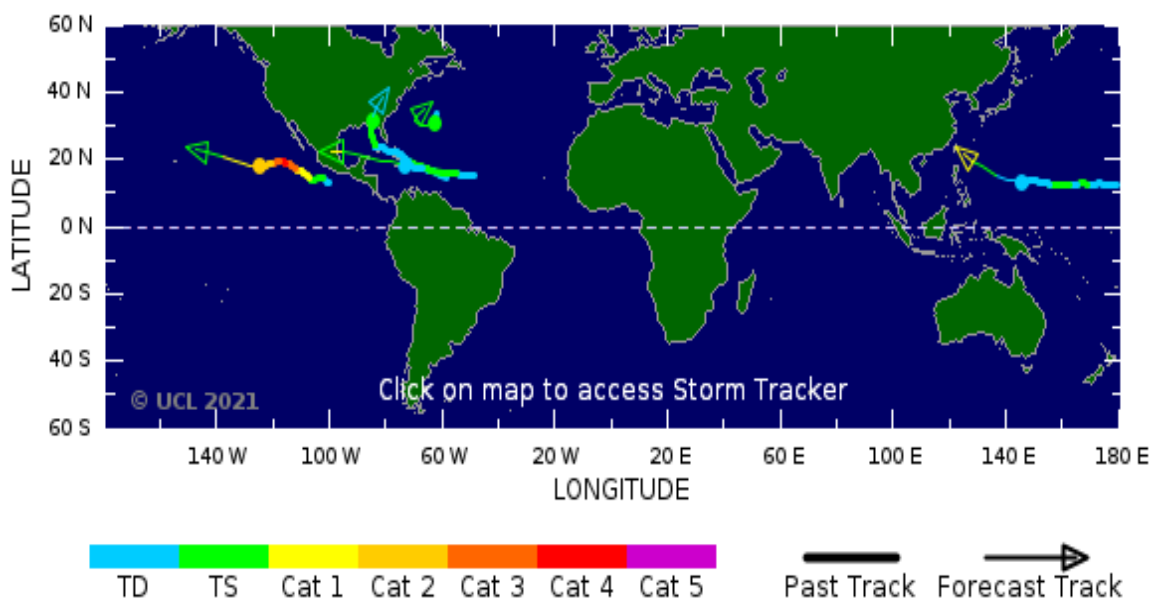


**Figure 2.** Outlook of wet and dry conditions over the Asian countries by ASMC.

### 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 16 August 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 17 August 2021.

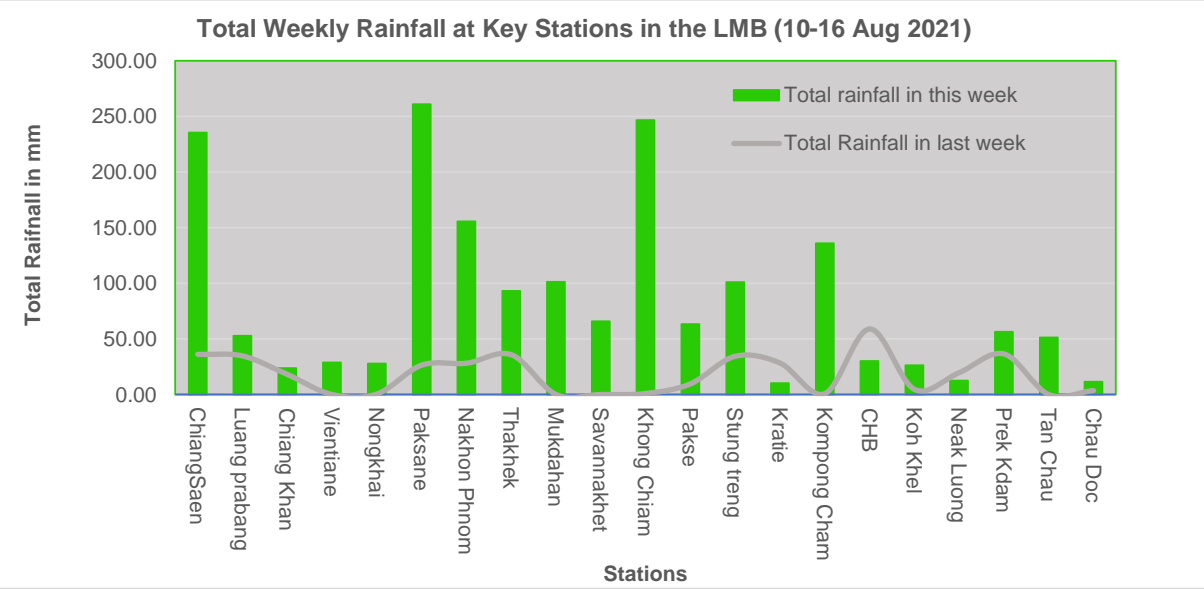
#### Active system as of 17 August 2021 3:32 GMT



**Figure 3.** A tropical depression risk observed on 17 August 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 10.20 mm to 261.00 mm. The weekly total rainfall from 10 to 16 August 2021 in this reporting week was considered higher, 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 10-16 August 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 10 to 16 August 2021.

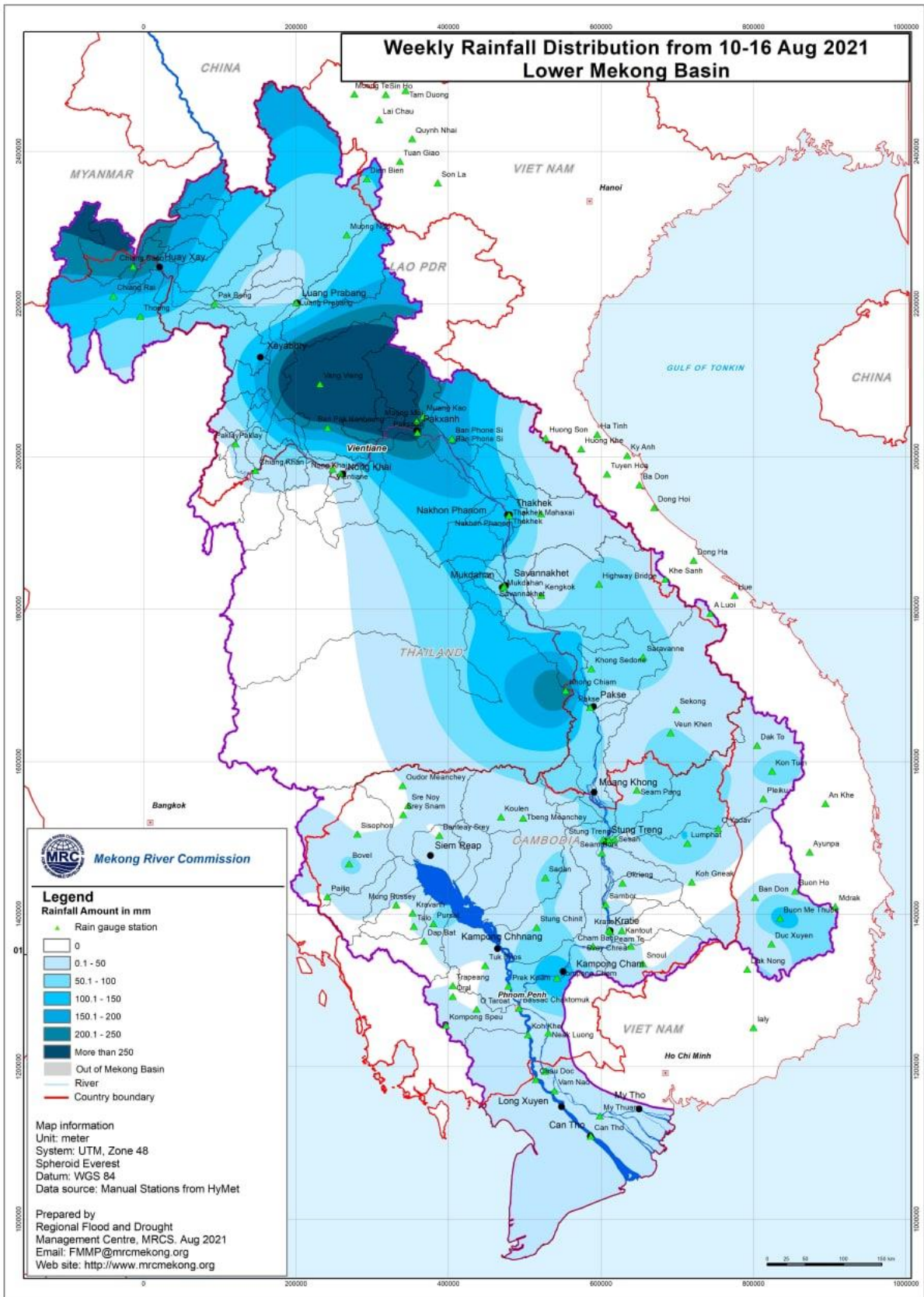
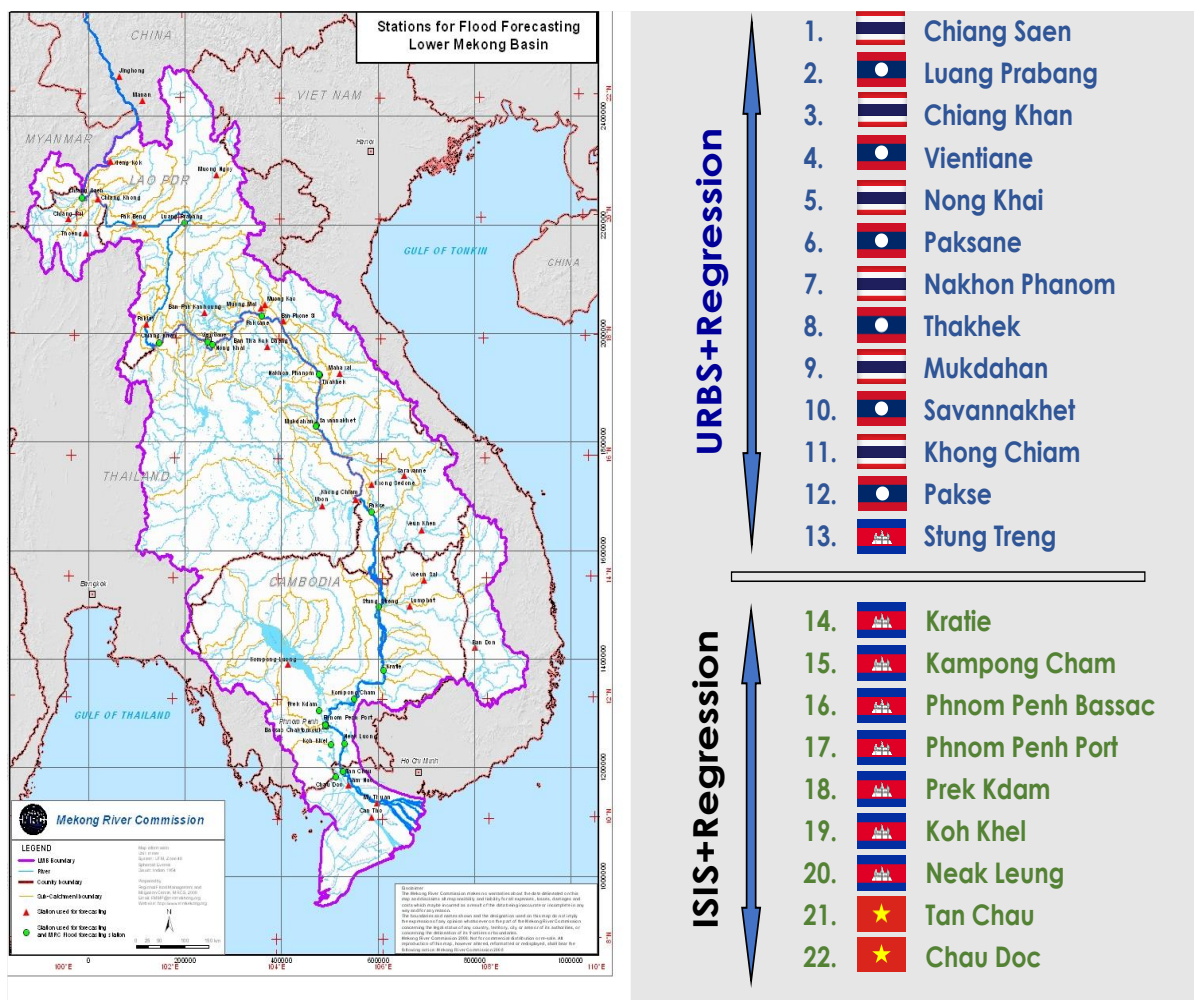


Figure 5. Weekly rainfall distribution over the LMB during 10-16 August 2021.

### 3 Water Levels in the Lower Mekong River

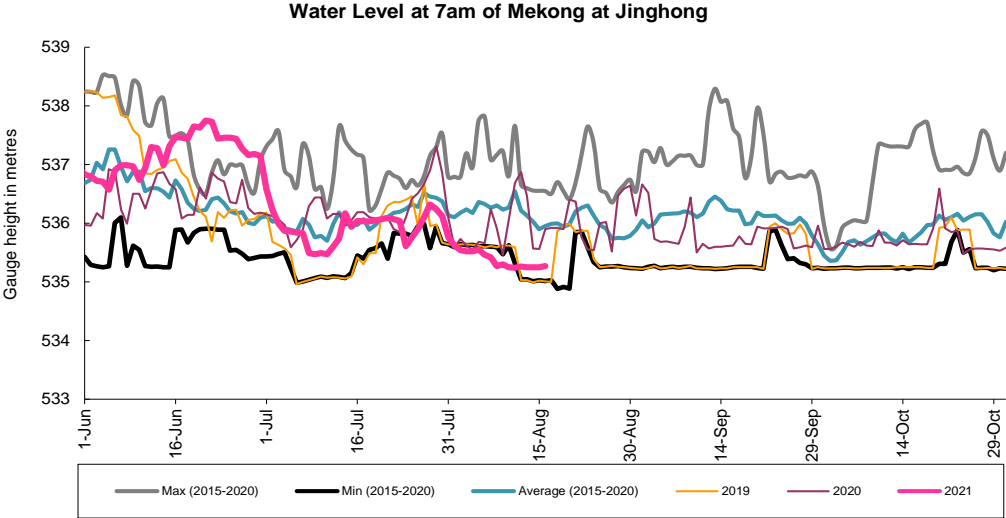
The hydrological regimes of the Mekong mainstream are illustrated by recorded water levels and flows at key mainstream stations: at Chiang Saen in Thailand to capture mainstream flows entering from the Upper Mekong Basin (UMB); at Vientiane in Lao PDR to present flows generated by climate conditions 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 10 to 16 August 2021. It was up about 0.02 m from 535.25 metres (m) on August 10 to 535.27 m on August 16. The outflows increased from 818 cubic metres per second (m<sup>3</sup>/s) on August 10 to 832 m<sup>3</sup>/s on August 16. [Figure 7](#) below presents water level fluctuations at the Jinghong hydrological station<sup>1</sup>, showing the levels from 10 to 16 August 2021 are a bit higher than their minimum level.



**Figure 7.** Water level at the Jinghong hydrological station during 1 July-16 Aug 2021.

Although the significantly low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Pakse in Lao PDR increased during August 10-16 due to above average rainfall in some parts of the LMB, but were still lower than their LTA. Similarly, water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia also went up following the same trend of the upstream ones.

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.

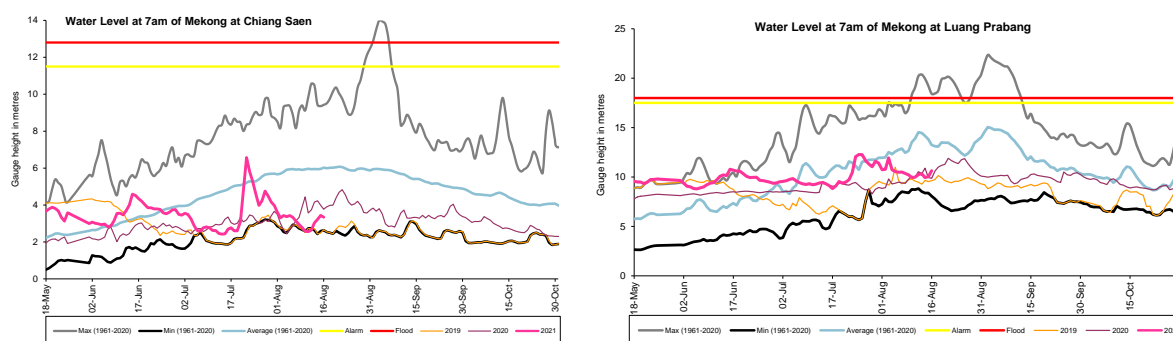
**Chiang Saen and Luang Prabang**

The water level from 10 to 16 August 2021 at Thailand’s Chiang Saen increased from 2.58 metres (m) to 3.34 m, showing an increase of 0.76 m but was still about 2.68 m lower than its LTA. Similarly, the water level at Luang Prabang station in Lao PDR also increased from 9.94 m to 10.64 m during the reporting period. This level shows 2.61 m lower than its LTA value. The trend – sometimes higher or lower to its historical maximum and LTA values – has been observed since early 2021. The phenomenon was potentially caused by upstream dam

<sup>1</sup> Near-real time data of hydro-meteorological monitoring at the Jinghong hydrological station is available at <https://portal.mrcmekong.org/monitoring/river-monitoring-telemetry>.

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.**

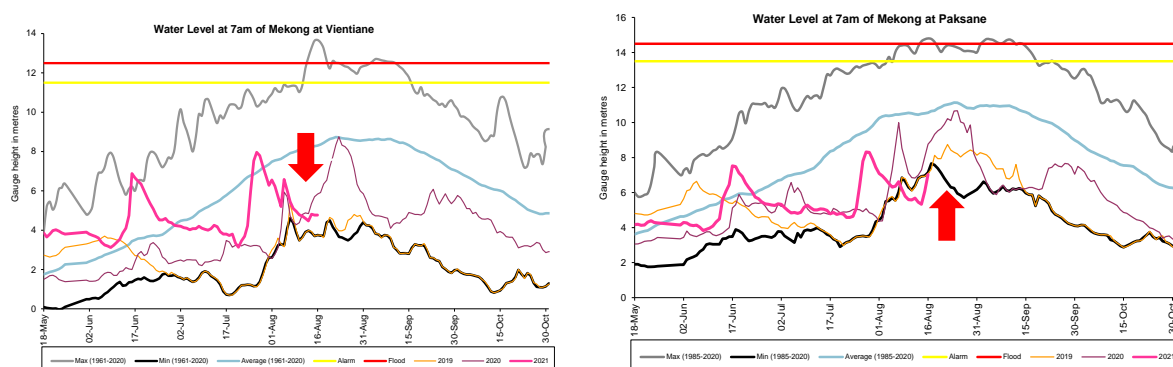


**Figure 8.** Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

### Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) decreased from 7.69 m to 7.64 m during the reporting week. This decrease showed 3.70 m lower than its Long-Term- Average (LTA), which was also close to its historical minimum level.

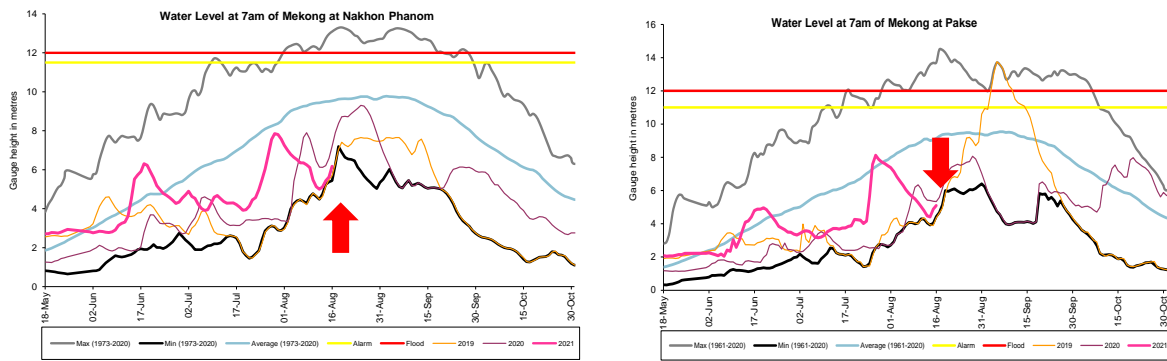
The water level downstream at Vientiane in Lao PDR followed the upstream trend. Water level also decreased from 4.78 m to 4.77 m and was about 3.53 m lower than its LTA from Aug 10 to 16. At Nong Khai station in Thailand, the water level decreased slightly during the reporting period. It was down about 0.13 m, decreasing between 4.62 m and 4.75 m and showing 4.46 m lower than its LTA and matched with its minimum level. Due to heavy rainfall in catchment area of this station (261 mm), water level at Paksane in Lao PDR significantly increased by about 1.43 m, rising from 5.60 m to 7.03 m. The WL at this station was still about 3.53 m lower than its LTA. The increased and decreased levels were obviously due to the effect of rainfall intensity in the sub-catchment area, inflow from upstream and the influence of the Nam Ngum dam operation located upstream. 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

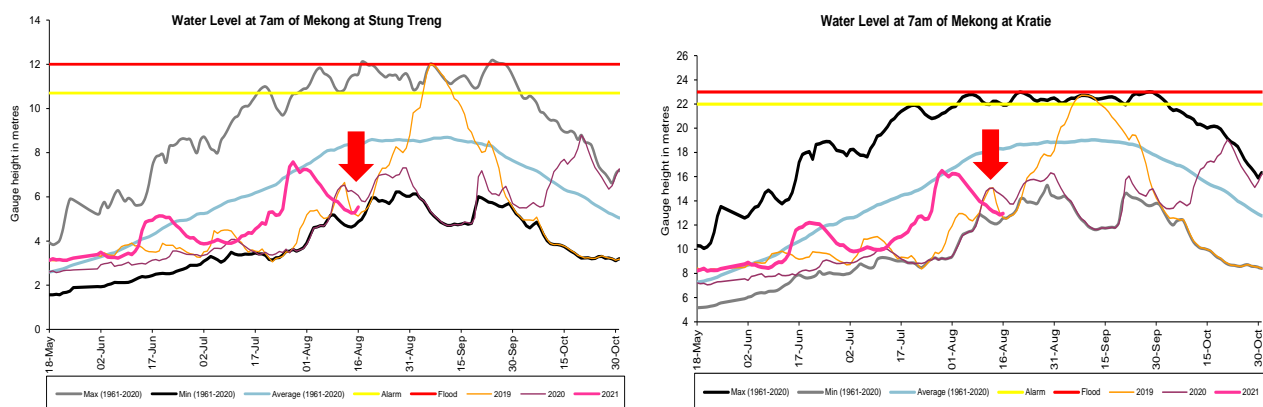
The water levels from Nakhon Phanom in Thailand and Thakhek in Lao PDR increased about 0.70 m due to above-average rainfall, while from Mukdahan in Thailand to Pakse in Lao PDR decreased about 0.15 m (less rainfall). The WL at these stations was still about 3.70 m lower than their LTA and also stayed close to their minimum level. [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

Due to below-average rainfall which led to low flows 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 decreased during 10-16 August 2021. This week water level at Stung Treng and Kratie decreased about 0.24 m and 0.84 m, respectively, showing about 3.00 m lower than their LTA (see [Figure 11](#)). The water level at Kompong Cham dropped about 0.86 m and stayed 0.07 m lower than its minimum value.



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

At Chaktomuk on the Bassac River, the water level decreased by about 0.44 m and stayed 0.09 m higher than its minimum value; while at Koh Khel, water level went down 0.40 m but stayed 0.09 m higher its minimum value. The water level at Prek Kdam on the Tonle Sap Lake dropped about 0.40 m and was about 0.11 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 decreased water level was likely due to less inflow and rainfall contribution 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.

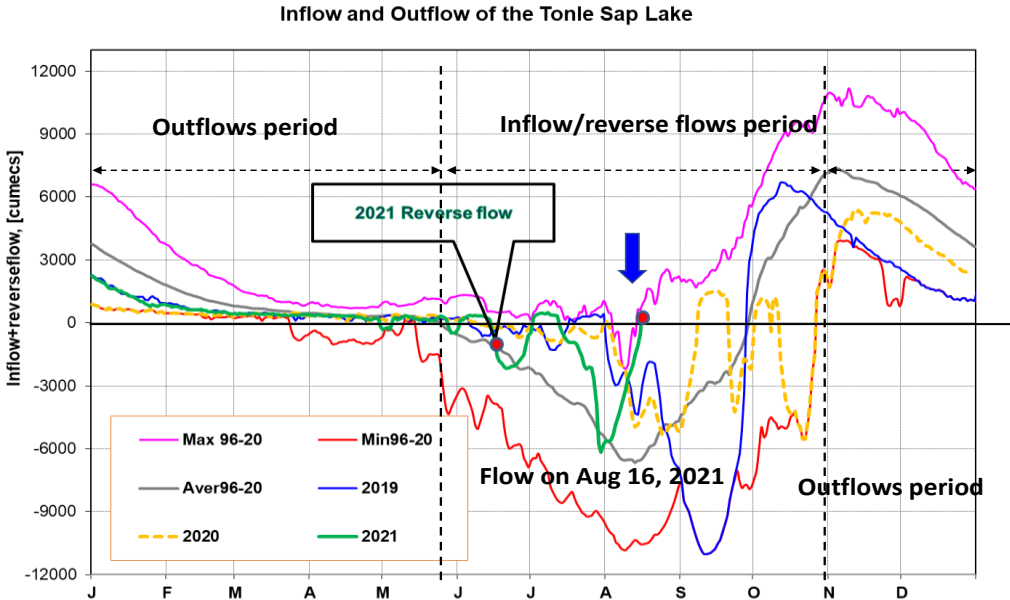
**Tidal stations at Tan Chau and Chau Doc**

Like last week, the water levels from 10 to 16 August 2021 at Viet Nam’s Tan Chau and Chau Doc fluctuated due to daily tidal effects from the sea. The fluctuation levels were between 0.77 m and 0.98 m; they were out of the historical range of their minimum levels and **considered abnormal condition.**

**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.

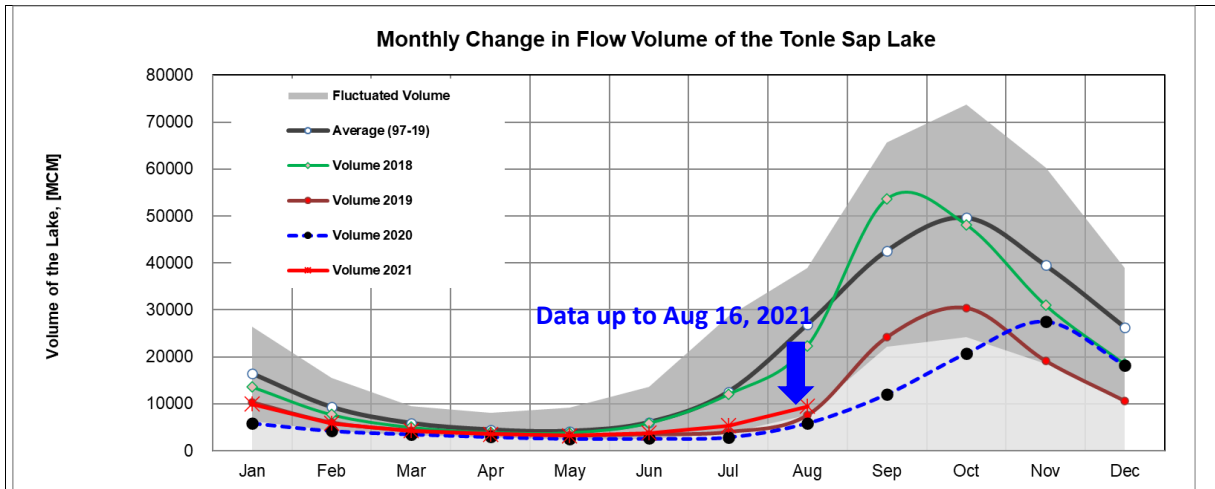
[Figure 12](#) shows the seasonal changes of the outflow of the Tonle Sap Lake at Prek Kdam in comparison with the flows of 2018 and 2019, and their LTA levels (1997–2019). Up to August 16 of this reporting period, **it was observed that the main inflow/reverse flow to Tonle Sap Lake increased due to above average-rainfall from upstream.** This increased inflow of Tonle Sap Lake was 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 condition. For next week, the above average rainfall is forecasted for the Tonle Sap area; thus, the inflow into 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 August 16 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 August 16, **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	9489.69
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 <sup>3</sup> )							

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.



Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Cambodia															
Date of FFG products 15/08/2021 06:00 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	
Kampong Cham	Stueng Trang	Veal Preah	Central Lowland	Low-Risk	Kampong Cham	Stueng Trang	Veal Preah	Central Lowland	Low-Risk	Stour Meanchey	Banteay Ampil	Pou Chas	North	Low-Risk	
Kampong Cham	Preaek Prasab	Stueng Tro	Northeast	Low-Risk	Kampong Cham	Stueng Trang	Sampleng Kraom	Central Lowland	Low-Risk	Kampong Cham	Stueng Trang	Veal Preah	Central Lowland	Low-Risk	
Kralie	Preaek Prasab	Svay Chum	Northeast	Low-Risk	Kampong Cham	Stueng Trang	Phum Chetsab	Central Lowland	Low-Risk	Kralie	Preaek Prasab	Stueng Tro	Northeast	Low-Risk	
Kampong Cham	Stueng Trang	Sampleng Kraom	Central Lowland	Moderate-Risk	Kampong Thom	Baray	Kokir Thum	Northwest	Low-Risk	Kralie	Preaek Prasab	Svay Chum	Northeast	Low-Risk	
Kampong Cham	Stueng Trang	Phum Chetsab	Central Lowland	Low-Risk	Kampong Thom	Baray	Khnhaom	Northwest	Low-Risk	Kampong Cham	Stueng Trang	Sampleng Kraom	Central Lowland	Low-Risk	
Kampong Thom	Baray	Kokir Thum	Northwest	Low-Risk	Kampong Cham	Cheung Prey	Ruessei Lor	Central Lowland	Low-Risk	Kampong Cham	Stueng Trang	Phum Chetsab	Central Lowland	Low-Risk	
Kampong Thom	Prey Chhor	Ou Chrok	Central Lowland	Low-Risk	Kampong Cham	Prey Chhor	Khvar	Central Lowland	Low-Risk	Kampong Thom	Baray	Pongro Ling	Northwest	Low-Risk	
Kampong Cham	Cheung Prey	Ruessei Lor	Central Lowland	Low-Risk	Kampong Cham	Baatheay	Rout	Central Lowland	Low-Risk	Kampong Cham	Baray	Khnhaom	Northwest	Low-Risk	
Kampong Cham	Kampong Siem	Routos	Central Lowland	Low-Risk	Kampong Cham	Prey Chhor	Ou Chrok	Central Lowland	Low-Risk	Kampong Cham	Cheung Prey	Ruessei Lor	Central Lowland	Low-Risk	
Toung Khmum	Memot	Kantout	Central Lowland	Low-Risk	Toung Khmum	Toung Khmum	Kok	Central Lowland	Low-Risk	Kampong Cham	Cheung Prey	Kngak	Central Lowland	Low-Risk	
Toung Khmum	Memot	Chamkar Thmei	Central Lowland	Low-Risk	Kampong Cham	Cheung Prey	Roluos	Central Lowland	Low-Risk	Kampong Cham	Prey Chhor	Kantout	Central Lowland	Low-Risk	
Kampong Cham	Prey Chhor	Khvav	Central Lowland	Low-Risk	Kampong Cham	Kampong Siem	Kampong Siem	Central Lowland	Low-Risk	Toung Khmum	Memot	Chamkar Thmei	Central Lowland	Low-Risk	
Kampong Cham	Prey Chhor	Trapeang Krasang	Central Lowland	Low-Risk	Kampong Cham	Prey Chhor	Trapeang Krasang	Central Lowland	Low-Risk	Toung Khmum	Memot	Chamkar Thmei	Central Lowland	Low-Risk	
Koh Kong	Thma Bang	Choam Sla	Southwestern	Low-Risk	Koh Kong	Thma Bang	Choam Sla	Southwestern	Low-Risk	Kampong Cham	Prey Chhor	Khvav	Central Lowland	Low-Risk	
Koh Kong	Thma Bang	Chamnar	Southwestern	Low-Risk	Koh Kong	Thma Bang	Chamnar	Southwestern	Low-Risk	Kampong Cham	Prey Chhor	Trapeang Krasang	Central Lowland	Low-Risk	
Koh Kong	Thma Bang	Soap Khley	Southwestern	Low-Risk	Koh Kong	Thma Bang	Soap Khley	Southwestern	Low-Risk	Koh Kong	Thma Bang	Soap Khley	Southwestern	Low-Risk	
Koh Kong	Thma Bang	Boang Trach	Southwestern	Low-Risk	Koh Kong	Thma Bang	Boang Trach	Southwestern	Low-Risk	Koh Kong	Thma Bang	Boang Trach	Southwestern	Low-Risk	
Sihanoukville	Prey Nob	Veal Thum	Southwest	Low-Risk	Koh Kong	Kampong Sella	Samdach Ta	Southwestern	Low-Risk	Sihanoukville	Prey Nob	Veal Thum	Southwest	Low-Risk	
Kampong Cham	Prey Chhor	Tro Mukh Ti Pir	Central Lowland	Low-Risk	Svay Rieng	Romeas Haek	Chhuk	Southwest	Low-Risk	Kampong Cham	Prey Chhor	Tro Mukh Ti Pir	Central Lowland	Low-Risk	
Kampong Cham	Prey Chhor	Doung	Central Lowland	Low-Risk	Kampong Cham	Prey Chhor	Doung	Central Lowland	Low-Risk	Kampong Cham	Prey Chhor	Doung	Central Lowland	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 15/08/2021 06:00 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				
Lai Chau	Muong Te	Northwest	Low-Risk	Lai Chau	Muong Te	Northwest	Low-Risk	Lai Chau	Muong Te	Northwest	Low-Risk				
Long An	Can Giuoc	Southwest-Mekong River Delta	Low-Risk	Lai Chau	Xuan Loc	Southeast	Low-Risk	Lai Chau	Dien Bien	Northwest	Low-Risk				
Dong Nai	Xuan Loc	Southeast	Low-Risk	Cao Bang	Hoa An	Northeast	Moderate-Risk	Long An	Can Giuoc	Southwest-Mekong River Delta	Low-Risk				
Tay Ninh	Tan Bien	Southeast	Low-Risk	Cao Bang	Ha Quang	Northeast	Low-Risk	Binh Thuan	Tanh Linh	South Central Coast	Low-Risk				
Cao Bang	Hoa An	Northeast	Moderate-Risk	Cao Bang	Nguyen Binh	Northeast	Moderate-Risk	Dong Nai	Xuan Loc	Southeast	Low-Risk				
Cao Bang	Ha Quang	Northeast	Low-Risk	Bac Kan	Ngan Son	Northeast	Low-Risk	Tay Ninh	Tan Bien	Southeast	Low-Risk				
Cao Bang	Nguyen Binh	Northeast	High-Risk	Quang Ninh	Hoanh Bo	Northeast	Low-Risk	Cao Bang	Hoa An	Northeast	Moderate-Risk				
Bac Kan	Ngan Son	Northeast	Low-Risk	Quang Ninh	Hoanh Bo	Northeast	Low-Risk	Cao Bang	Ha Quang	Northeast	Low-Risk				
Quang Ninh	Tien Yen	Northeast	Low-Risk	Quang Ninh	TX Cam Pha	Northeast	Moderate-Risk	Cao Bang	Nguyen Binh	Northeast	Moderate-Risk				
Quang Ninh	Hoanh Bo	Northeast	Low-Risk	Quang Ninh	TP Ha Long	Northeast	Low-Risk	Bac Kan	Ngan Son	Northeast	Low-Risk				
Quang Ninh	TP Cam Pha	Northeast	High-Risk	Quang Ninh	Hoanh Bo	Northeast	Low-Risk	Quang Ninh	Tien Yen	Northeast	Low-Risk				
Quang Ninh	TP Ha Long	Northeast	Low-Risk	Quang Ninh	TP Ha Long	Northeast	Low-Risk	Quang Ninh	Hoanh Bo	Northeast	Low-Risk				
Quang Ninh	TP Ha Long	Northeast	Low-Risk	Hai Phong	An Hai	Red River Delta	Low-Risk	Quang Ninh	Hoanh Bo	Northeast	Low-Risk				
Hai Phong	An Hai	Red River Delta	Low-Risk	Hai Phong	Thuy Nguyen	Red River Delta	Low-Risk	Quang Ninh	TP Cam Pha	Northeast	Moderate-Risk				
Hai Phong	Thuy Nguyen	Red River Delta	Low-Risk	Quang Ninh	Yen Hung	Northeast	Low-Risk	Quang Ninh	TP Ha Long	Northeast	Low-Risk				
Quang Ninh	Yen Hung	Northeast	Low-Risk	Thai Binh	Dong Hung	Red River Delta	Low-Risk	Quang Ninh	Hoanh Bo	Northeast	Low-Risk				
Thai Binh	Thai Thuy	Red River Delta	Low-Risk	Bac Kan	Cho Don	Northeast	Low-Risk	Quang Ninh	TP Ha Long	Northeast	Low-Risk				
Thai Binh	Thai Thuy	Red River Delta	Low-Risk	Lao Cai	Bat Xat	Northwest	Moderate-Risk	Quang Ninh	Yen Hung	Northeast	Low-Risk				
Thai Binh	Dong Hung	Red River Delta	Low-Risk	Lao Cai	Than Uyen	Northwest	Moderate-Risk	Hai Phong	An Hai	Red River Delta	Low-Risk				
Thai Binh	Dong Hung	Red River Delta	Low-Risk	Lao Cai	Van Ban	Northwest	Low-Risk	Hai Phong	Thuy Nguyen	Red River Delta	Low-Risk				
Bac Kan	Cho Don	Northeast	Low-Risk	Yen Bai	Mu Cang Chai	Northwest	Low-Risk	Quang Ninh	Yen Hung	Northeast	Low-Risk				
Lao Cai	Van Ban	Northwest	Low-Risk	Hoa Binh	Da Bac	Northwest	Low-Risk	Thai Binh	Thai Thuy	Red River Delta	Low-Risk				
Yen Bai	Mu Cang Chai	Northwest	Low-Risk	Lao Cai	Sa Pa	Northwest	Low-Risk	Thai Binh	Dong Hung	Red River Delta	Low-Risk				
Son La	Bac Yen	Northwest	Moderate-Risk	Son La	Muong La	Northwest	Low-Risk	Bac Kan	Cho Don	Northeast	Low-Risk				
Hoa Binh	Da Bac	Northwest	Moderate-Risk	Lai Chau	Sin Ho	Northwest	Low-Risk	Lao Cai	Bat Xat	Northwest	Moderate-Risk				
Lao Cai	Than Uyen	Northwest	Moderate-Risk	Lai Chau	Phong Tho	Northwest	Low-Risk	Lao Cai	Than Uyen	Northwest	Moderate-Risk				
Lao Cai	Sa Pa	Northwest	Moderate-Risk	Lai Chau	TX Lai Chau	Northwest	Low-Risk	Lao Cai	Van Ban	Northwest	Low-Risk				
Son La	Muong La	Northwest	Low-Risk	Son La	Mai Son	Northwest	Low-Risk	Son La	Bac Yen	Northwest	Moderate-Risk				
Lai Chau	Sin Ho	Northwest	Low-Risk	Son La	Bac Yen	Northwest	Moderate-Risk	Phu Tho	Thanh Son	Northeast	Low-Risk				
Lao Cai	Than Uyen	Northwest	Low-Risk	Son La	Phu Yen	Northwest	Moderate-Risk	Phu Tho	Thanh Son	Northeast	Low-Risk				
Lai Chau	Phong Tho	Northwest	Low-Risk	Ha Giang	Xin Man	Northeast	Low-Risk	Hoa Binh	Da Bac	Northwest	Moderate-Risk				
Lao Cai	Bat Xat	Northwest	High-Risk	Ha Giang	Hoang Su Phi	Northeast	Low-Risk	Lao Cai	Sa Pa	Northwest	Moderate-Risk				
Lai Chau	TX Lai Chau	Northwest	Low-Risk	Tuyen Quang	Chiem Hoa	Northeast	Low-Risk	Son La	Quyinh Nhai	Northwest	Low-Risk				
Lao Cai	Hai Son	Northwest	Low-Risk	Tuyen Quang	Na Hang	Northeast	Moderate-Risk	Thai Binh	Thai Thuy	Red River Delta	Low-Risk				
Son La	Moc Chau	Northwest	High-Risk	Bac Kan	Ba Be	Northeast	Low-Risk	Yen Bai	Mu Cang Chai	Northwest	Low-Risk				
Son La	Phu Yen	Northwest	High-Risk	Bac Kan	Bach Thong	Northeast	Low-Risk	Son La	Muong La	Northwest	Low-Risk				
Ha Giang	Xin Man	Northeast	Low-Risk	Ha Giang	Vi Xuyen	Northeast	Low-Risk	Lai Chau	Sin Ho	Northwest	Low-Risk				
Ha Giang	Hoang Su Phi	Northeast	Low-Risk	Ha Giang	Quan Ba	Northeast	Low-Risk	Lai Chau	Phong Tho	Northwest	Low-Risk				
Tuyen Quang	Chiem Hoa	Northeast	Low-Risk	Ha Giang	Bac Quang	Northeast	Low-Risk	Lai Chau	Muong Lay	Northwest	Low-Risk				
								Lai Chau	TX Lai Chau	Northwest	Low-Risk				

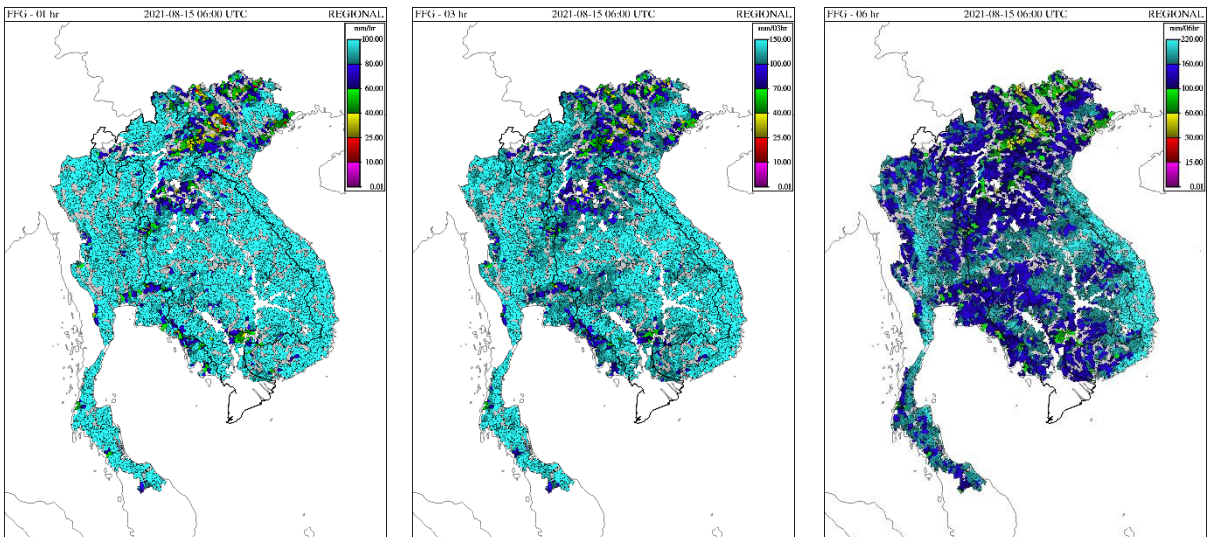


Figure 14. Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on August 15.

## 5 Drought Monitoring in the Lower Mekong Basin

### Weekly drought monitoring from 31 July to 6 Aug 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 7 to 13, as shown in [Figure 15](#), shows that the LMB was experiencing moderate and severe meteorological droughts mainly in the upper and central parts and the lower ridge of the region. In the north severe drought took place in Thailand's Chiang Mai, Chiang Rai, and Phayao and Lao PDR's Xayaburi and Xieng Khuang; in central part drought occurred in Thailand's Nong Bua Lamphu, Udon Thani, Sakon Nakhon, Muk Dahan, Kalasin, Khon Kaen, Chaiyaphum, Nakhon Ratchasima, Buriram, Maha Sarakham, Surin, Roi Et, Yasothon, Amnat Charoen, and Ubon Ratchathani and Lao PDR's Sekong and Attapeu; and in the southern part, drought took place in Viet Nam's Long An, Tien Giang, Ben Tre, Tra Vinh, Soc Trang, Bac Lieu, Kien Giang, and Ca Mau, and Cambodia's Svay Rieng.

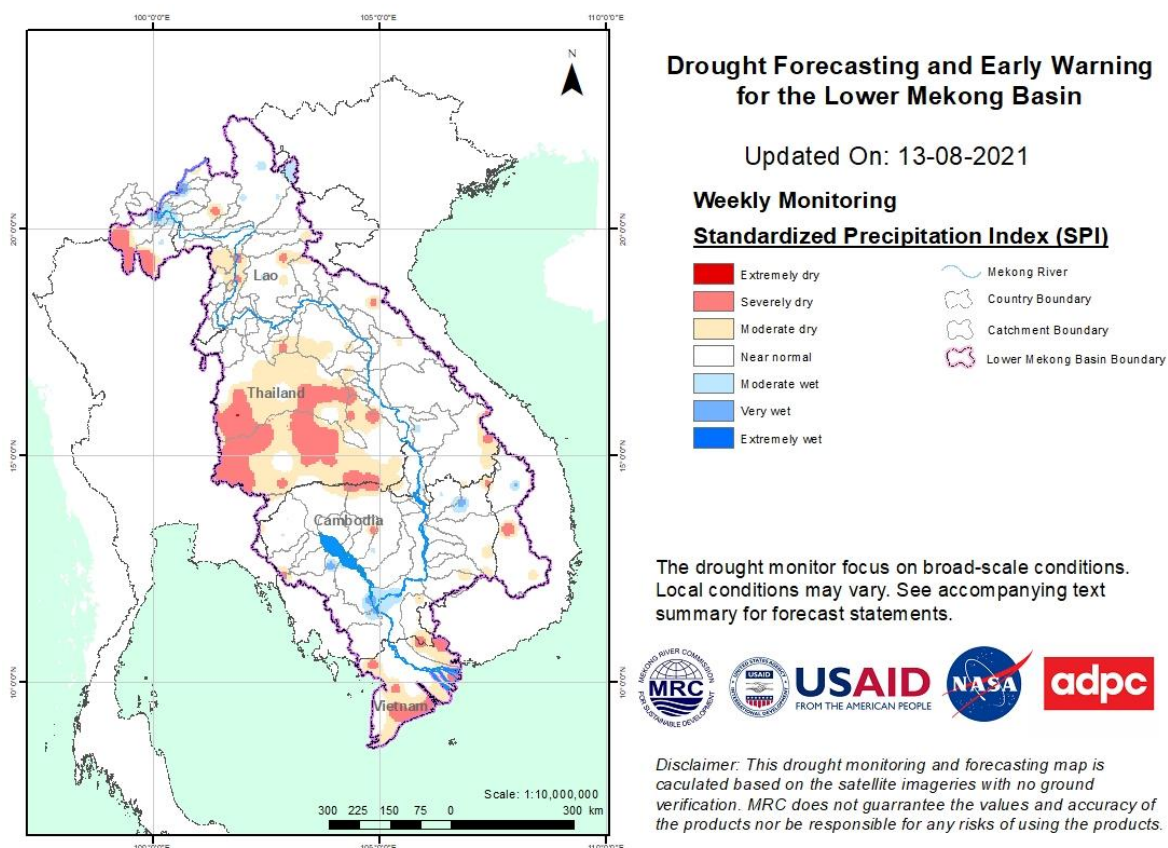
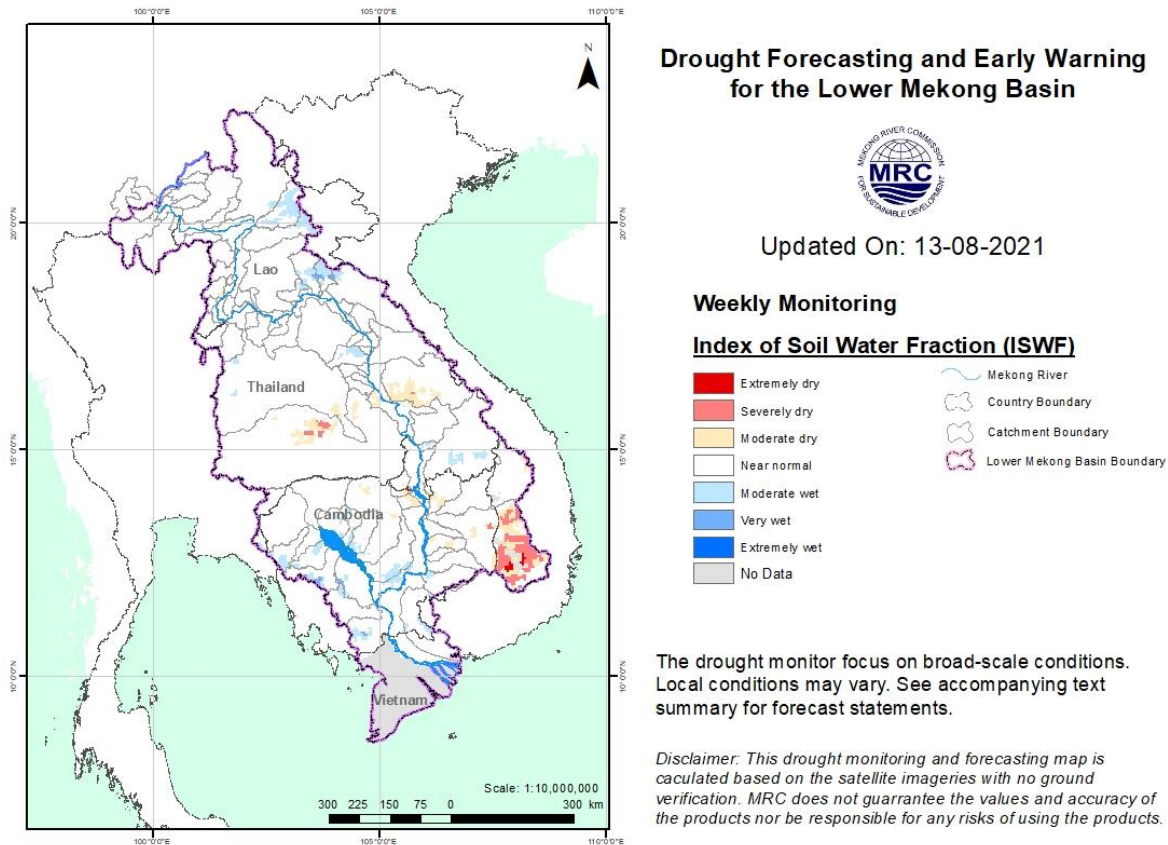


Figure 15. Weekly standardized precipitation index from 7-13 Aug 2021.

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

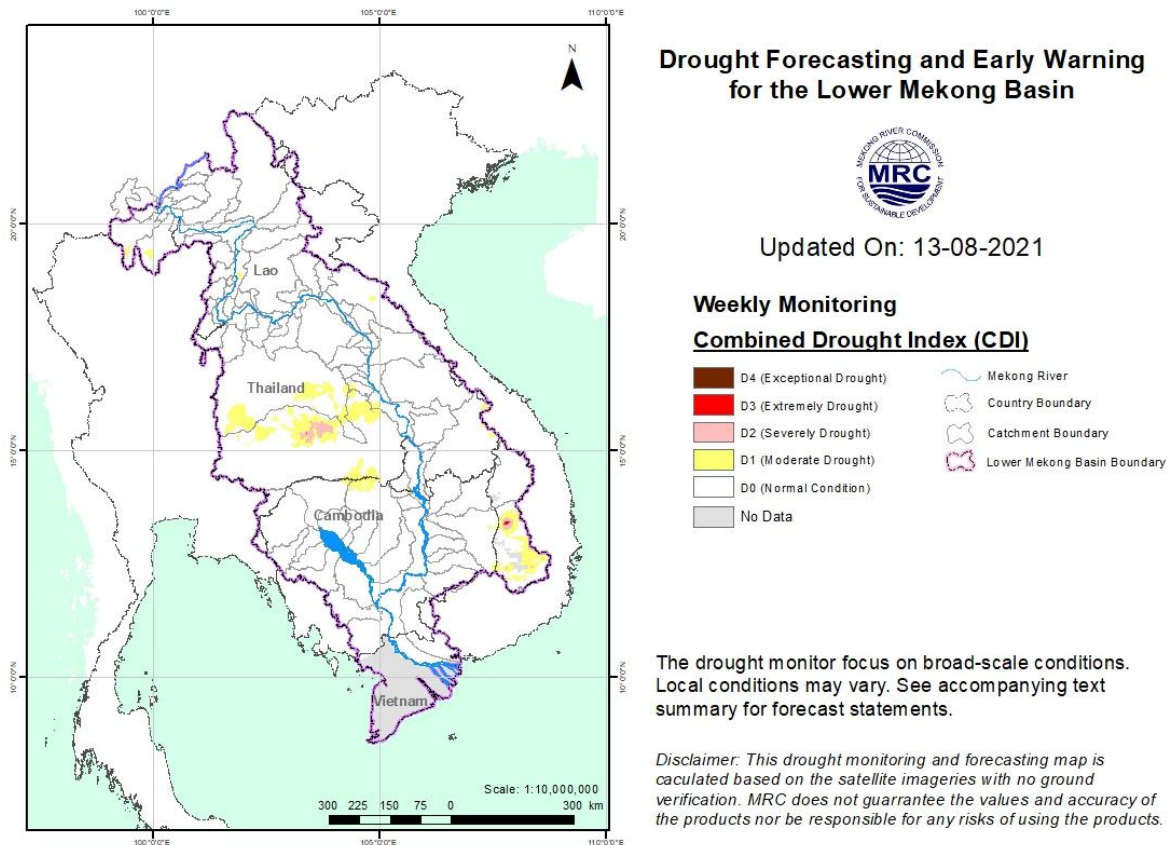
Soil water fraction from August 7 to 13, as displayed in [Figure 16](#), shows that the LMB region was moderately and severely dry in only Dak Lak and Gia Lai of Viet Nam in the lower part of the region. The rest parts of the LMB were normal.



**Figure 16.** Weekly Soil Moisture Anomaly from 7 to 13 August 2021.

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

With such severe meteorological drought, from August 7 to 13 the LMB was getting better in compared to the previous week. However, the region was still experiencing some moderate and severe droughts in overall conditions mainly in the central part of the region covering Roi Et, Maha Sarakham, Surin, Yasothon, and Amrat Charoen. In the lower part of the LMB, some areas of Dak Lak and Gia Lai were also experiencing some moderate and severe droughts. [Figure 17](#) below displays the combined drought indicator map of the LMB.



**Figure 17.** Weekly Combined Drought Index from 7 to 13 August 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.

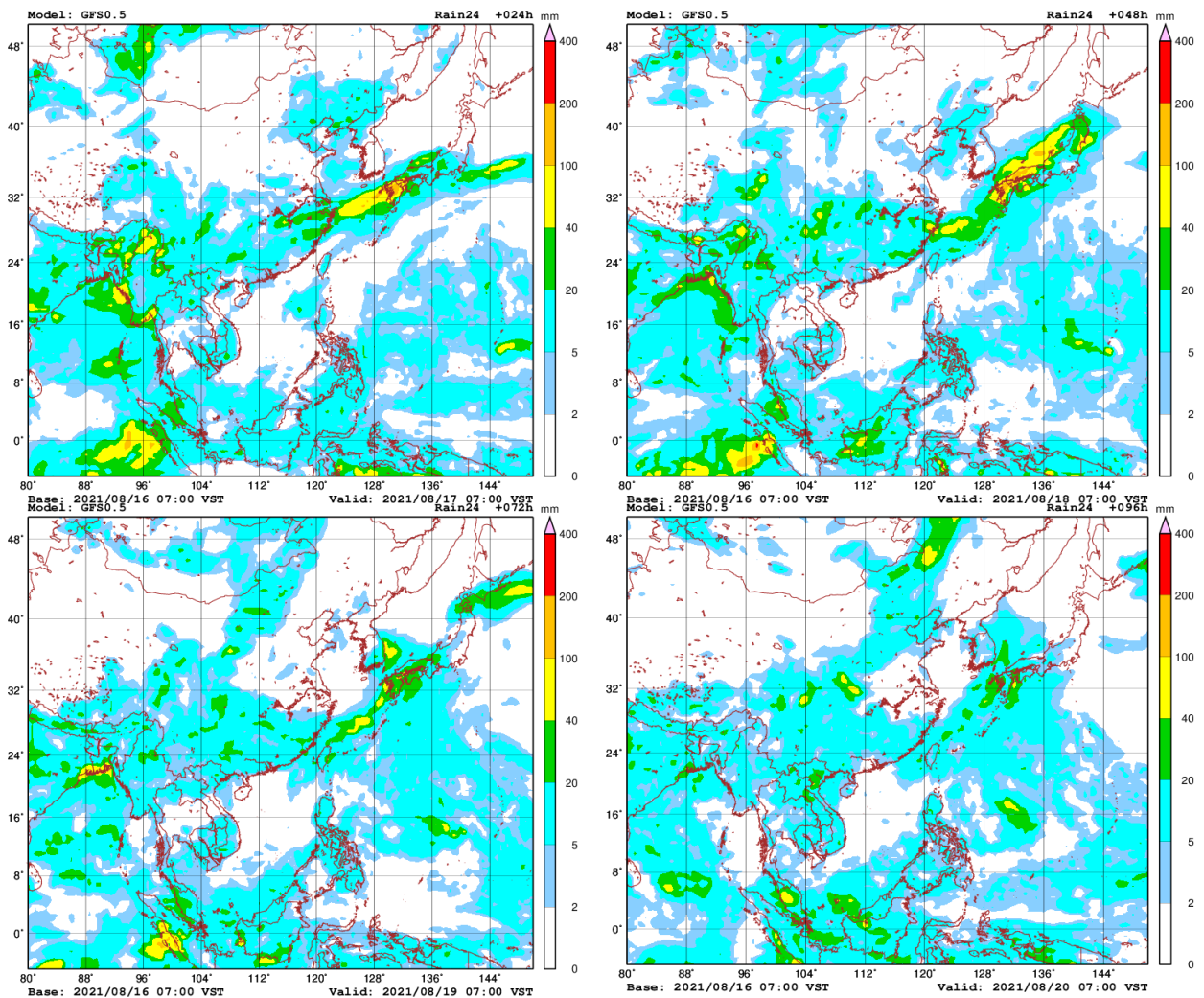
## 6 Weather and Water Level Forecast and Flash Flood Information

### 6.1 Weather and rainfall forecast

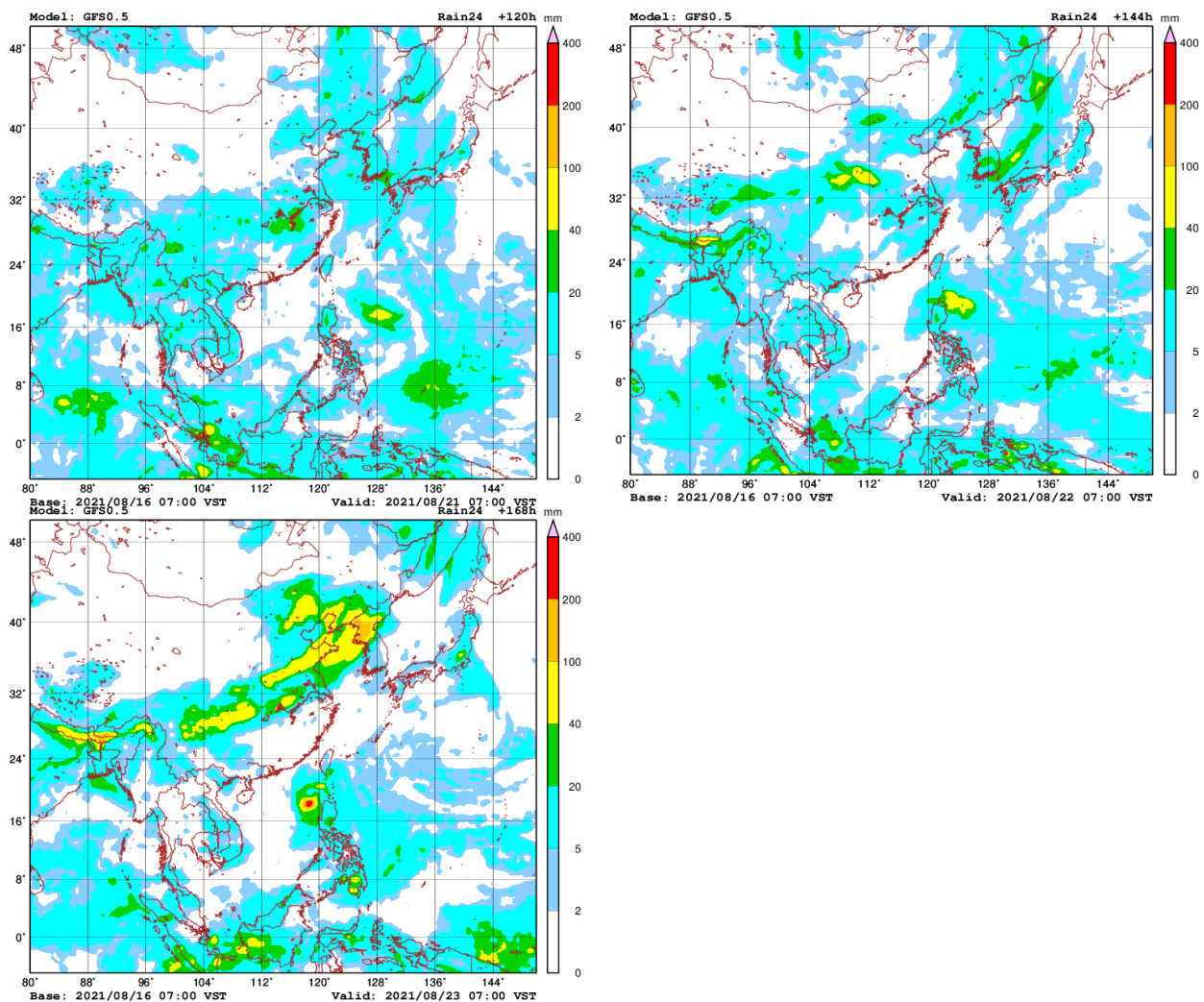
Based on the analysis of the synoptic meteorological information and result from the Global Forecast System (GFS) model, in the coming week, the southwest monsoon and low-pressure cell will continue prevailing over the LMB.

From August 17-23, small rainfall (0 -20 mm/24h) will likely occur in the LMB.

[Figure 18](#) shows accumulated rainfall forecast (24 h) of the GFS model from August 17-23.







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

## 6.2 Water level forecast

### Chiang Saen and Luang Prabang

Based on August 16's daily flood forecasting bulletin, the daily forecasted water level at Chiang Saen in Thailand is expected to slightly increase from 3.34 m to 3.50 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 10.64 m to 11.50 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 increase about 0.85 m, while water level at Vientiane in Lao PDR will increase about 0.90 m. Furthermore, from Nong Khai in Thailand to Paksane in Lao PDR, the water levels will rise in between 0.30 m and 1.50 m over the next five days. Rainfall is forecasted for the area of Paksane next week.

The water levels are expected to go up but still lower than their LTA at Chiang Khan, Vientiane and Nong Khai, while water level at Paksane is going to rise above its minimum level.

### **Nakhon Phanom to Pakse**

The water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR are forecasted to increase between 1.00 m and 1.55 m over the next five days. From Khong Chiam in Thailand to Pakse in Lao PDR, the water levels will also increase about 1.60 m. The water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR will stay lower than their LTA, with some forecasted rainfall for the areas 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 1.00 m to 1.50 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 seven 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 higher than their LTA, 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 10 to 16 August 2021, is presented in **Annex 1**.

[Table 2](#) shows the daily flood forecasting Bulletin issued on August 16. Results of the weekly river monitoring bulletin are also available at [http://ffw.mrcmekong.org/bulletin\\_wet.php](http://ffw.mrcmekong.org/bulletin_wet.php).

## **6.3 Flash Flood Information**

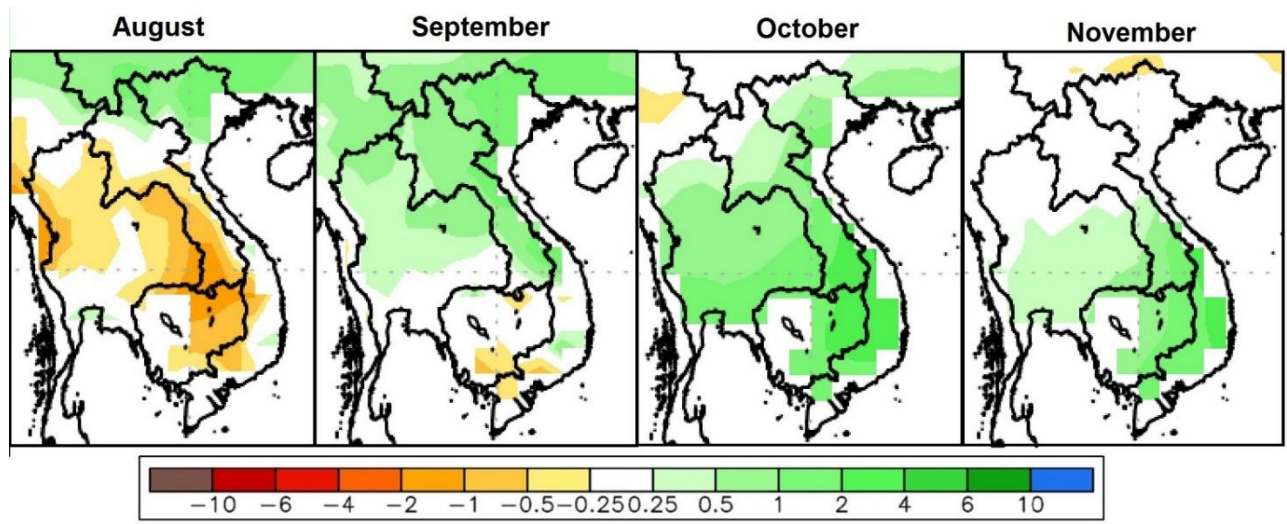
With small rainfall forecasted for next week, flash floods with high level are not expected to take place in the LMB. However, local heavy rain in a short period of time is possible with unexpected short flash floods. The information on flash flood guidance for the next one, three, and six hours is updated twice daily 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 September 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 August 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 July reveals that the LMB is likely to receive much below average rainfall in August mainly in the central and southern parts of the region; September is forecasted to be extremely wet in the north, moderately wet and normal in the middle, and normal and moderately dry in southern areas 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: 17 August - 21 August 2021**

Date: 16 August 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								
						15-Aug	16-Aug	17-Aug	18-Aug	19-Aug	20-Aug	21-Aug	16	17	18	19	20	21			
Jinghong		28.0				535.25	535.27										X	X	X	X	X
Chiang Saen		2.3	357.110	12.80	11.50	3.44	3.34	3.45	3.50	3.55	3.53	3.50									
Luang Prabang		15.2	267.195	18.00	17.50	10.04	10.64	11.15	11.25	11.45	11.51	11.56									
Chiang Khan		6.8	194.118	16.00	14.50	7.71	7.64	8.17	8.52	8.60	8.75	8.80									
Vientiane		9.6	158.040	12.50	11.50	4.77	4.77	4.80	5.35	5.71	5.81	5.98									
Nongkhai		5.4	153.648	12.20	11.40	4.62	4.62	4.69	5.27	5.63	5.75	5.93									
Paksane		37.2	142.125	14.50	13.50	6.07	7.03	7.65	7.75	8.20	8.50	8.58									
Nakhon Phanom		30.5	130.961	12.00	11.50	5.62	6.18	6.83	7.25	7.33	7.66	7.88									
Thakhek		33.2	129.629	14.00	13.00	6.79	7.30	7.95	8.38	8.48	8.83	9.07									
Mukdahan		6.0	124.219	12.50	12.00	5.54	5.82	6.25	6.73	7.06	7.11	7.30									
Savannakhet		7.2	125.410	13.00	12.00	3.70	4.01	4.40	4.85	5.15	5.20	5.35									
Khong Chiam		5.6	89.030	14.50	13.50	6.40	6.66	7.00	7.51	8.03	8.40	8.49									
Pakse		8.9	86.490	12.00	11.00	4.88	5.10	5.42	5.90	6.40	6.73	6.80									
Stung Treng		nr	36.790	12.00	10.70	5.28	5.54	5.70	5.82	6.15	6.51	6.65									
Kratie		nr	-0.101	23.00	22.00	12.84	12.96	13.35	13.58	13.73	14.10	14.50									
Kompong Cham		nr	-0.930	16.20	15.20	7.36	7.28	7.40	7.80	8.05	8.22	8.60									
Phnom Penh (Bassac)		nr	-1.020	12.00	10.50	4.38	4.33	4.38	4.55	4.66	4.73	4.88									
Phnom Penh Port		-	0.070	11.00	9.50	3.40	3.35	3.40	3.57	3.68	3.75	3.90									
Koh Khel (Bassac)		nr	-1.000	8.40	7.90	4.15	4.07	4.09	4.19	4.25	4.28	4.38									
Neak Luong		nr	-0.330	8.00	7.50	3.14	3.11	3.05	3.11	3.28	3.40	3.48									
Prek Kdam		nr	0.080	10.00	9.50	3.51	3.44	3.46	3.58	3.66	3.71	3.82									
Tan Chau		0.0	0.000	4.50	3.50	0.88	0.94	0.99	1.05	1.08	1.12	1.20									
Chau Doc		nr	0.000	4.00	3.00	0.76	0.83	0.90	0.98	1.03	1.08	1.17									

**REMARKS:**

-: not available.  
nr: no rain.

LEGEND		
rising water level		<b>Note:</b> 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. <b>Flood stage</b> is when the flood level exceeds. A flood level is determined by each Member Country. <b>Alarm stage</b> is when the water level ranges between alarm and flood levels. <b>Alarm situation</b> is when the water level is forecasted to reach the flood stage within the next three days.
stable water level		
falling water level		
alarm stage		
alarm situation		
flood stage		
no data available	X	

River Flood Forecaster

KHEM Sothea

**NOTE:** Discharge at Luang Prabang may be influenced by hydropower operations (at both upstream and downstream).  
For more info, please refer to this link:  
<http://www.mrcmekong.org/>; [http://ffw.mrcmekong.org/bulletin\\_wet.php](http://ffw.mrcmekong.org/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 10-16, including the lower part in Cambodia and Viet Nam, varying from 10.20 mm to 261.00 mm.

Based on the forecasted satellite data, rainfall is forecasted for some areas of the LMB with value ranging from 10 mm to 100 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 17 to 23 August 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 10 to 16 August 2021. It was up about 0.02 m from 535.25 metres (m) on August 10 to 535.27 m on August 16. The outflows increased from 818 cubic metres per second (m<sup>3</sup>/s) on August 10 to 832 m<sup>3</sup>/s on August 16.

Amid the significantly low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Pakse in Lao PDR increased during August 10-16 due to above average rainfall in the some parts of the LMB, but were still lower than their LTA. Similarly, water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia also went up following the same trend of the upstream ones.

Over the next few days, the water levels from Chiang Khan to Vientiane and from Nakhon Phanom to Pakse are expected to continue increasing by about 0.35 m and 1.30 m, respectively.

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 lower than their LTA (from upper to lower stretches within the LMB) but are likely to start rising by the 3<sup>rd</sup> 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 small amount of rainfall for the coming week as mentioned earlier in [section 6.1](#), no major flash floods are expected in the LMB during next week. However, local heavy rain in a short period of time is possible with unexpected short flash floods.

### **7.4 Drought condition and its forecast**

With severe meteorological drought, from August 7 to 13 the LMB was still experiencing some moderate and severe droughts in overall conditions mainly in the central part of the region covering Roi Et, Maha Sarakham, Surin, Yasothon, and Amrat Charoen. In the lower part of the LMB, some areas of Dak Lak and Gia Lai were also experiencing some moderate and severe droughts.

For the upcoming three-month forecast, the LMB is likely to receive much below average rainfall in August mainly in the central and southern parts of the region; September is forecasted to be extremely wet in the north, moderately wet and normal in the middle, and normal and moderately dry in southern areas 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.

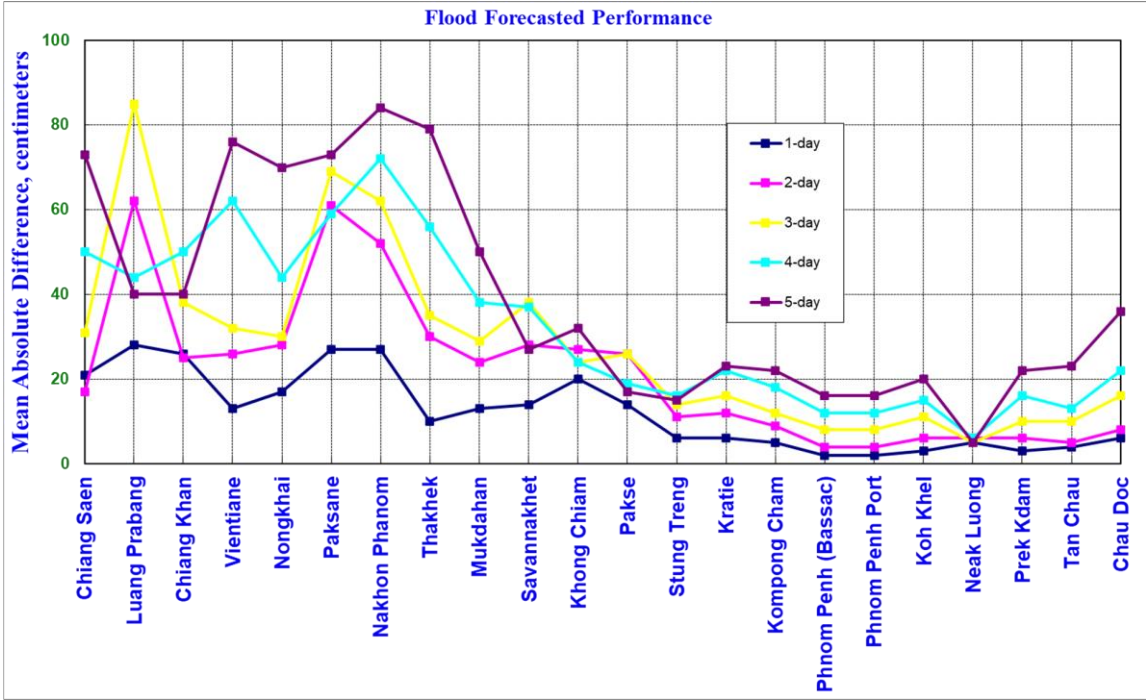
# Annex 1: Performance of the weekly flood forecasting

## 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 10 to 16 August 2021.

The forecasting values from 10 to 16 August 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 Thakhek 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 10 to 16 August, 2021.



**Table B1:** The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 10-16 August, 2021 in cm

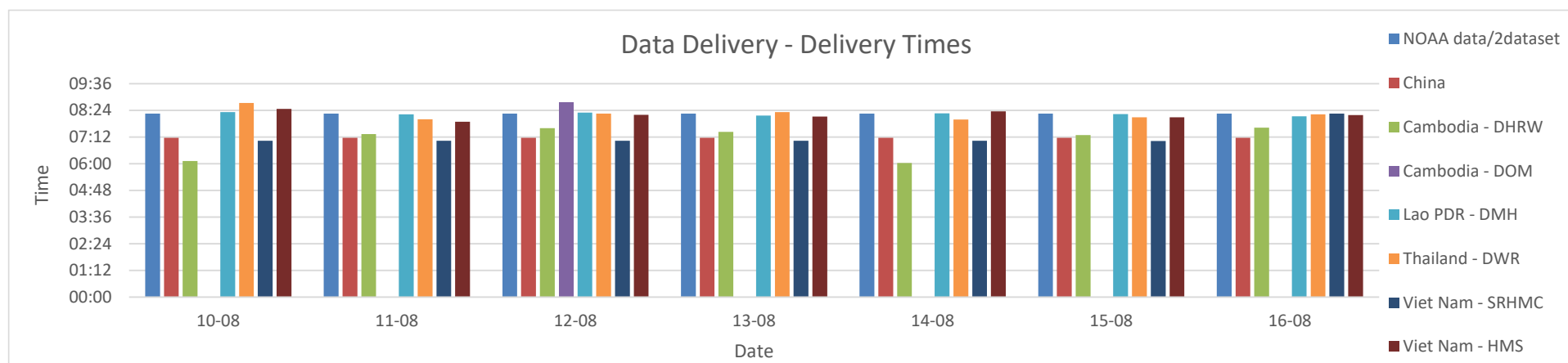
Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khei	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	<u>21</u>	<u>28</u>	<u>26</u>	13	17	<u>27</u>	<u>27</u>	10	13	14	<u>20</u>	14	6	6	5	2	2	3	5	3	4	6
2-day	17	62	<u>25</u>	<u>26</u>	<u>28</u>	61	52	<u>30</u>	<u>24</u>	<u>28</u>	<u>27</u>	<u>26</u>	11	12	9	4	4	6	6	6	5	8
3-day	<u>31</u>	85	<u>38</u>	<u>32</u>	<u>30</u>	69	62	<u>35</u>	<u>29</u>	<u>38</u>	<u>24</u>	<u>26</u>	14	16	12	8	8	11	5	10	10	16
4-day	<u>50</u>	<u>44</u>	<u>50</u>	62	<u>44</u>	59	72	56	<u>38</u>	<u>37</u>	<u>24</u>	19	16	<u>22</u>	18	12	12	15	6	16	13	<u>22</u>
5-day	73	<u>40</u>	<u>40</u>	76	70	73	84	79	<u>50</u>	<u>27</u>	<u>32</u>	17	15	<u>23</u>	<u>22</u>	16	16	<u>20</u>	5	<u>22</u>	<u>23</u>	<u>36</u>

**Table B2:** The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 10-16 August, 2021 in %

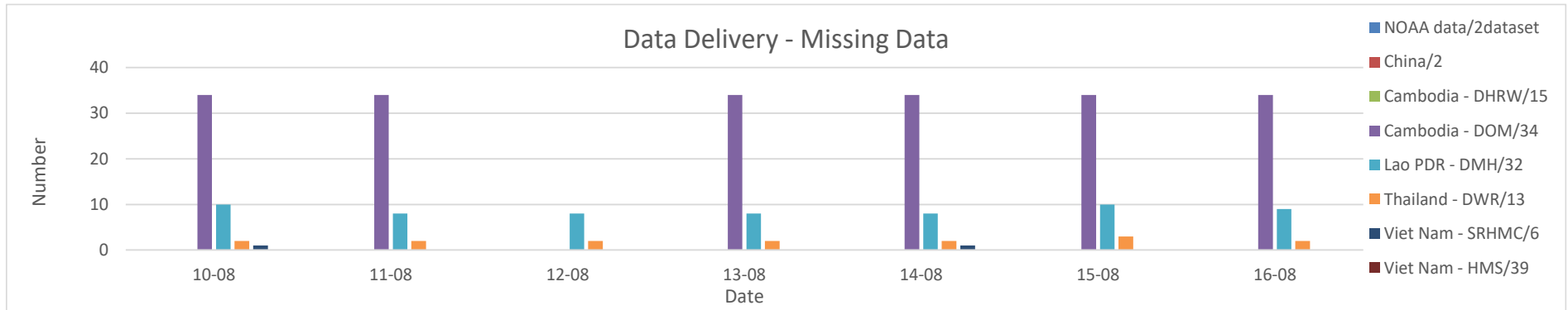
Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khei	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	Average
1-day	57.1	57.1	57.1	57.1	71.4	57.1	85.7	71.4	71.4	<u>42.9</u>	71.4	57.1	57.1	71.4	71.4	57.1	57.1	71.4	71.4	<u>42.9</u>	71.4	57.1	<b>63.0</b>
2-day	<u>50.0</u>	16.7	66.7	66.7	66.7	<u>50.0</u>	66.7	83.3	66.7	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	66.7	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	66.7	<u>50.0</u>	<b>55.3</b>
3-day	<u>40.0</u>	60.0	60.0	60.0	<u>40.0</u>	<u>40.0</u>	60.0	60.0	<u>40.0</u>	60.0	60.0	60.0	<u>40.0</u>	60.0	60.0	80.0	80.0	80.0	<u>40.0</u>	60.0	<u>40.0</u>	60.0	<b>56.4</b>
4-day	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<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>	75.0	<u>50.0</u>	<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>25.0</u>	<u>25.0</u>	<b>51.1</b>
5-day	<u>33.3</u>	66.7	<u>33.3</u>	<u>33.3</u>	66.7	<u>33.3</u>	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	66.7	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	<b>56.1</b>

**Table B3: Overview of performance indicators for the past 7 days from 10 to 16 August 2021**

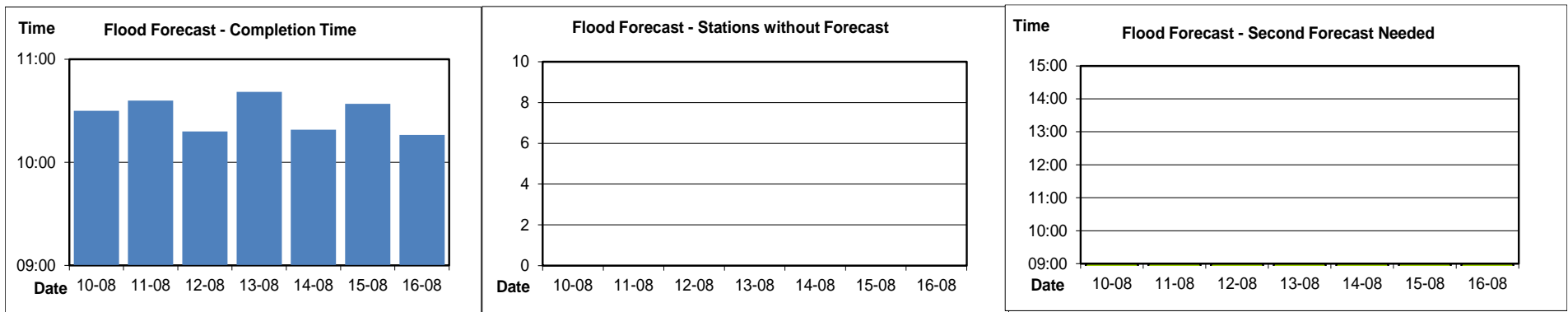
	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
	FF completed and sent (time)	Stations without forecast	FF2 completed and sent (time)	Weather data available (time)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - 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
<b>2021</b>																				
week	10:27	00:00	-	-	08:15	07:10	07:03	08:46	08:14	08:13	07:12	08:11	0	0	0	204	61	15	2	0
month	10:30	00:00	-	-	08:15	07:10	07:21	08:36	08:26	08:14	07:17	08:08	0	0	14	272	334	48	7	38



**Fig. B4: Data delivery times for the past 7 days from 10 to 16 August 2021**



**Fig. B5: Missing data for the past 7 days from 10 to 16 August 2021**



**Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 10 to 16 August 2021**



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