



Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin 17-23 August 2021

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

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Contents

- Figures..... ii
- Table iii
- Key Messages 1
- 1 Introduction 2
- 2 General Weather Patterns 3
 - 2.1 Tropical depressions (TD), tropical storms (TS) and typhoons (TY) 4
 - 2.2 Rainfall patterns over the LMB 5
- 3 Water Levels in the Lower Mekong River 7
- 4 Flash Flood in the Lower Mekong Basin 13
- 5 Drought Monitoring in the Lower Mekong Basin..... 15
- 6 Weather and Water Level Forecast and Flash Flood Information 18
 - 6.1 Weather and rainfall forecast 18
 - 6.2 Water level forecast 19
 - 6.3 Flash Flood Information..... 20
 - 6.4 Drought forecast 21
- 7 Summary and Possible Implications 23
 - 7.1 Rainfall and its forecast 23
 - 7.2 Water level and its forecast 23
 - 7.3 Flash flood and its trends..... 24
 - 7.4 Drought condition and its forecast 24
- Annex 1: Performance of the weekly flood forecasting 25

Figures

Figure 1. Summary of weather conditions over the LMB.	3
Figure 2. Outlook of wet and dry conditions over the Asian countries by ASMC.	4
Figure 3. A tropical depression risk observed on 23 August 2021.....	4
Figure 4. Weekly total rainfall at key stations in the LMB during 17-23 August 2021.	5
Figure 5. Weekly rainfall distribution over the LMB during 17-23 August 2021.	6
Figure 6. Key stations and model application for River Monitoring and Flood Forecasting.	7
Figure 7. Water level at the Jinghong hydrological station during 1 July-23 Aug 2021.	8
Figure 8. Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.....	9
Figure 9. Water levels Veintiane and Paksane in Lao PDR.....	9
Figure 10. Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR.....	10
Figure 11. Water levels at Stung Treng and Kratie on the Mekong River.	10
Figure 12. Seasonal change of inflows and outflows of Tonle Sap Lake	11
Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.	12
Figure 14. Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on August 15.	14
Figure 15. Weekly standardized precipitation index from 7-13 Aug 2021.....	15
Figure 16. Weekly Soil Moisture Anomaly from 7 to 13 August 2021.....	16
Figure 17. Weekly Combined Drought Index from 7 to 13 August 2021.....	17
Figure 18. Accumulated rainfall forecast (24 h) based on a GFS model.....	19
Figure 19. Daily average of monthly rainfall anomaly forecast from August to November 2021.....	21

Table

Table 1. The monthly change in the flow volume of Tonle Sap Lake.	12
Table 2. Weekly River Monitoring Bulletin.	22

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 3.60 millimetres (mm) to 169.90 mm.
- There will be some rainfalls for the next 5 days over the Mekong region from 24 to 29 August 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 17 to 23 August 2021. It was rising about 0.26 metres (m) from 535.26 m on August 17 to 535.52 m on August 23. The outflows increased from 825 cubic metres per second (m³/s) on August 17 to 997 m³/s on August 23.
- Amid the significantly low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Paksane in Lao PDR increased during August 17-23 due to average rainfall in some parts of the LMB. However, water levels from Nakhon Phanom in Thailand to Pakse were even lower than their historical minimum level. Like Chiang Saen and Paksane, water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia went up following 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 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

- Drought situation was getting better in the monitoring week during August 14-20. The combined drought indicator shows no significant threat in the region amid some meteorological droughts in the middle part of the LMB.
- 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 **17-23 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.

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 23 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.

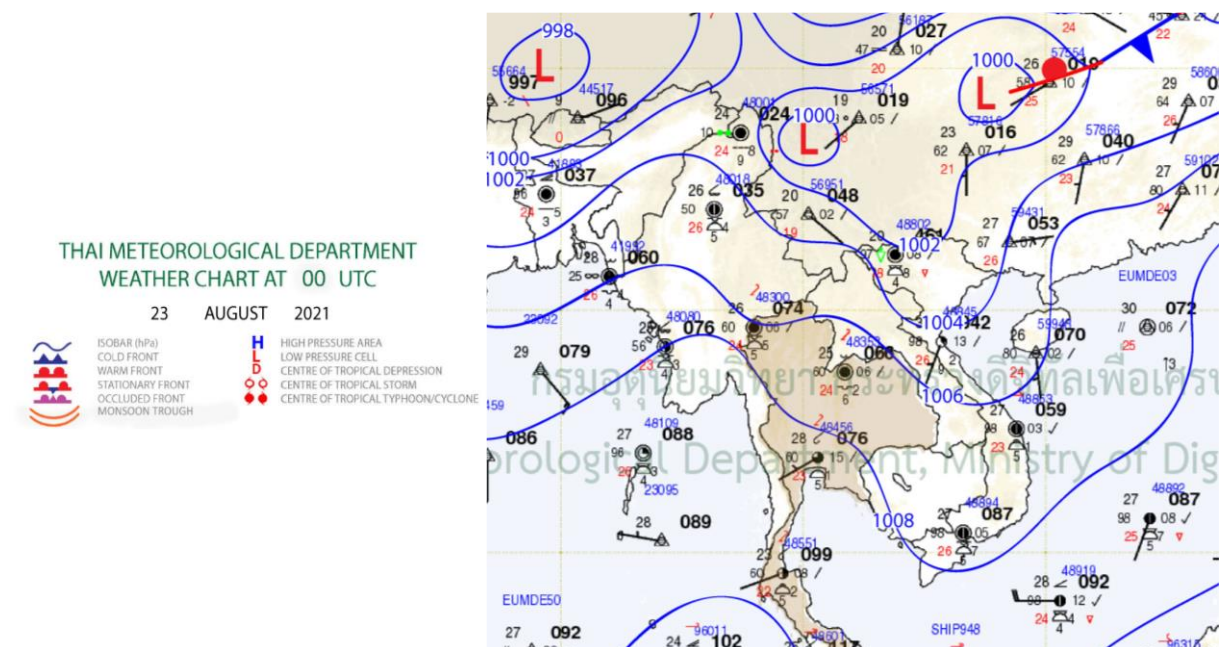


Figure 1. Summary of weather conditions over the LMB.

According to the ASEAN Specialised Meteorological Centre (ASMC), a highest probability of wetter condition is predicted over of the lower part of the Mekong region covering Lao PDR and Thailand from 23 August to 5 September 2021, during the 3rd and 4th weeks of August. Nonetheless, Cambodia and Viet Nam are likely dominated by wetter condition, which may receive above 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).

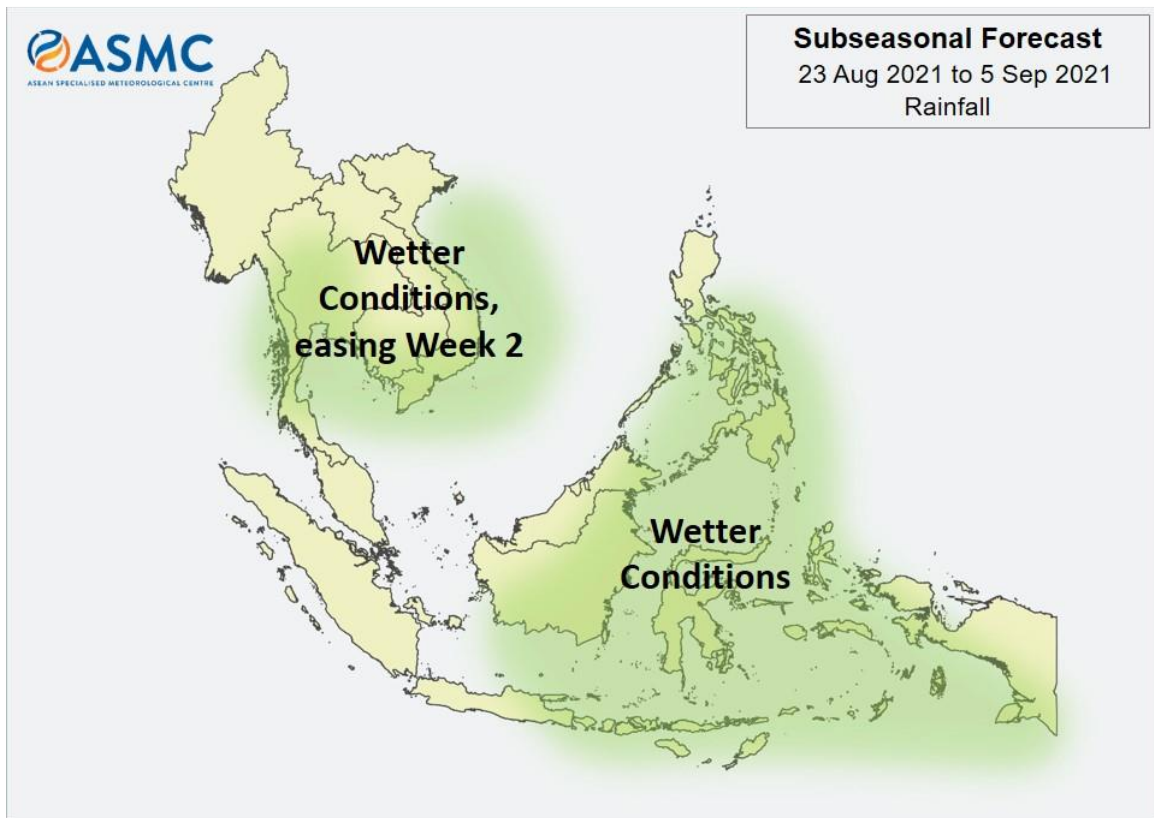


Figure 2. Outlook of wet and dry conditions over the Asian countries by ASMC.

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 23 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 23 August 2021.

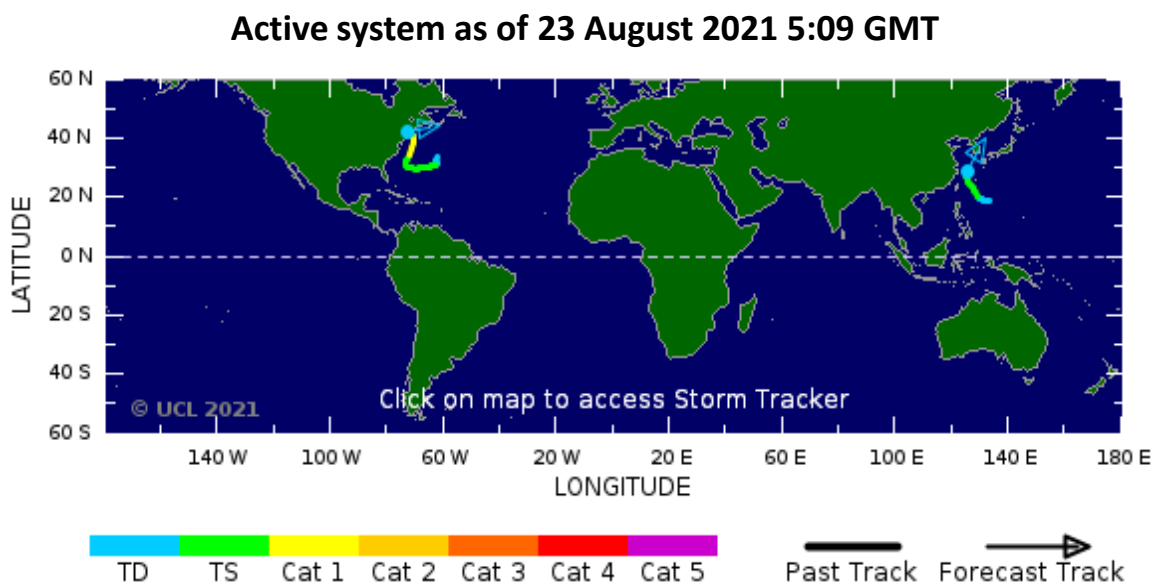


Figure 3. A tropical depression risk observed on 23 August 2021.

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 3.60 mm to 169.90 mm. The weekly total rainfall from 17 to 23 August 2021 in this reporting week was considered low, compared with last week rainfall in the Lower part of the LMB (see [Figure 4](#)).

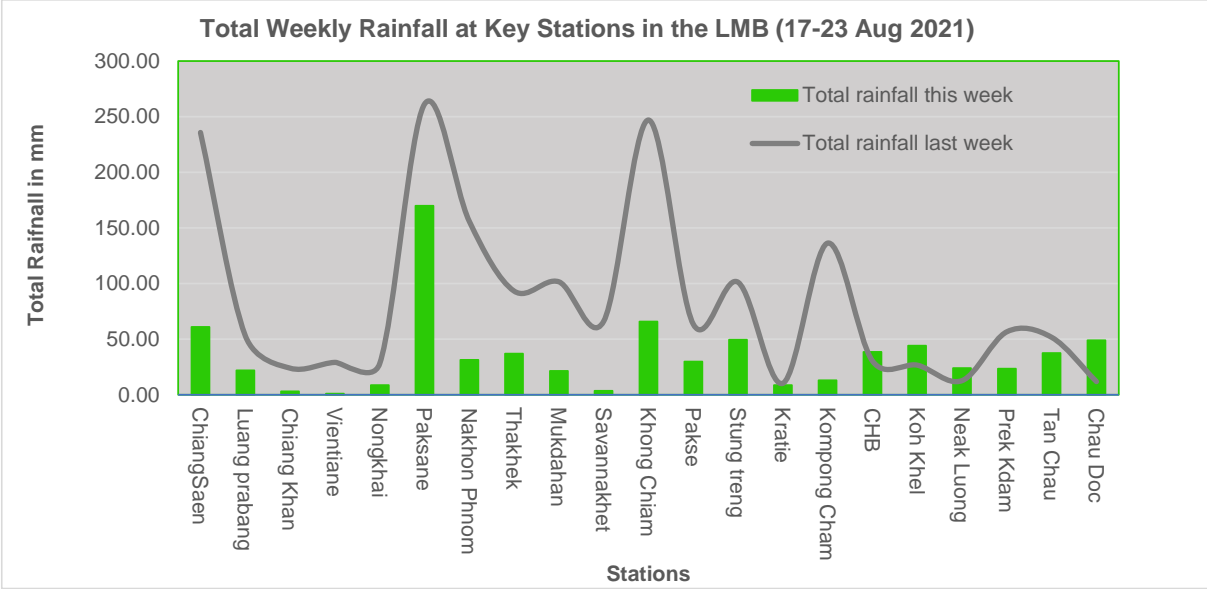


Figure 4. Weekly total rainfall at key stations in the LMB during 17-23 August 2021.

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 17 to 23 August 2021.

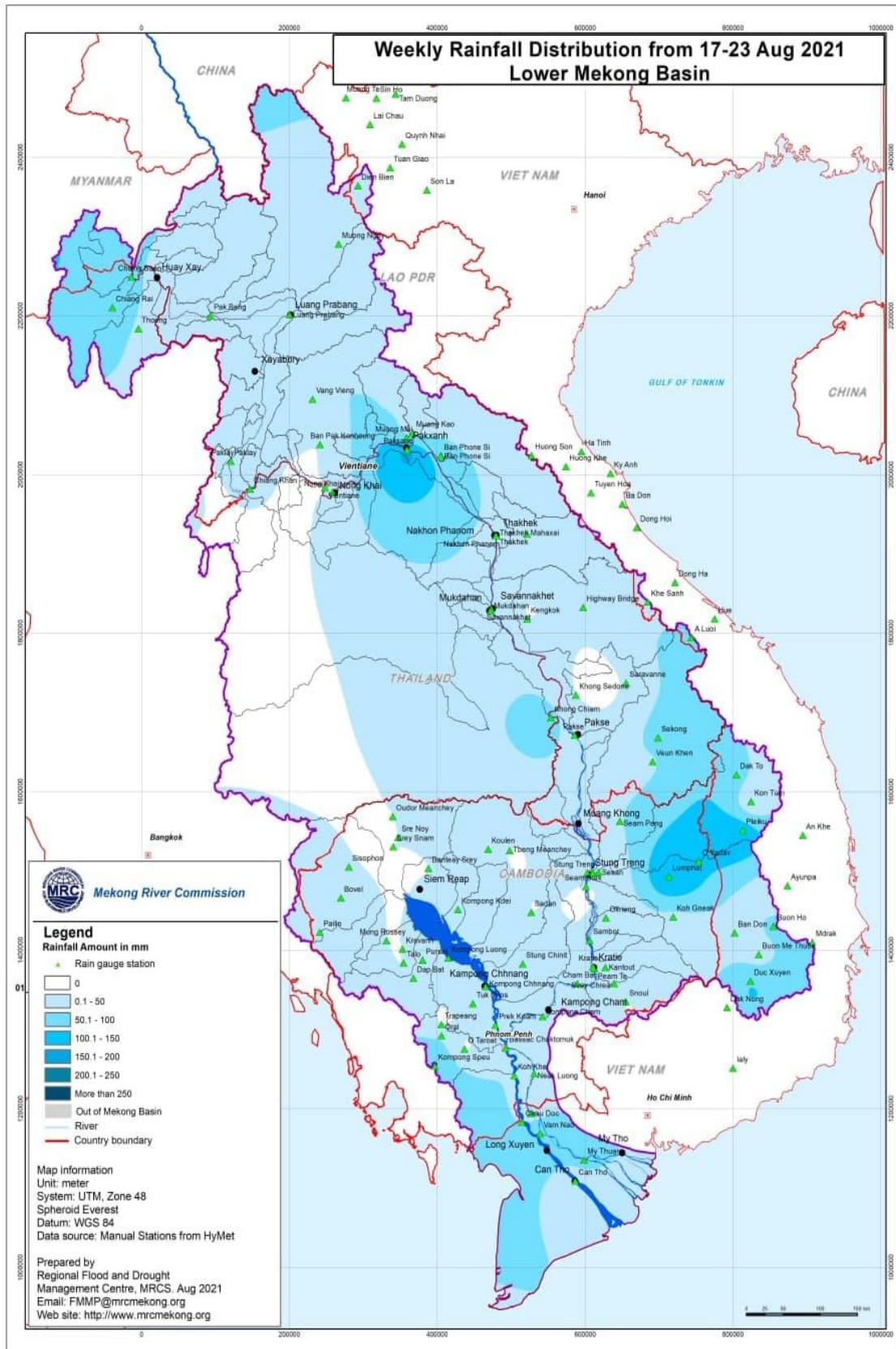


Figure 5. Weekly rainfall distribution over the LMB during 17-23 August 2021.

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](#).

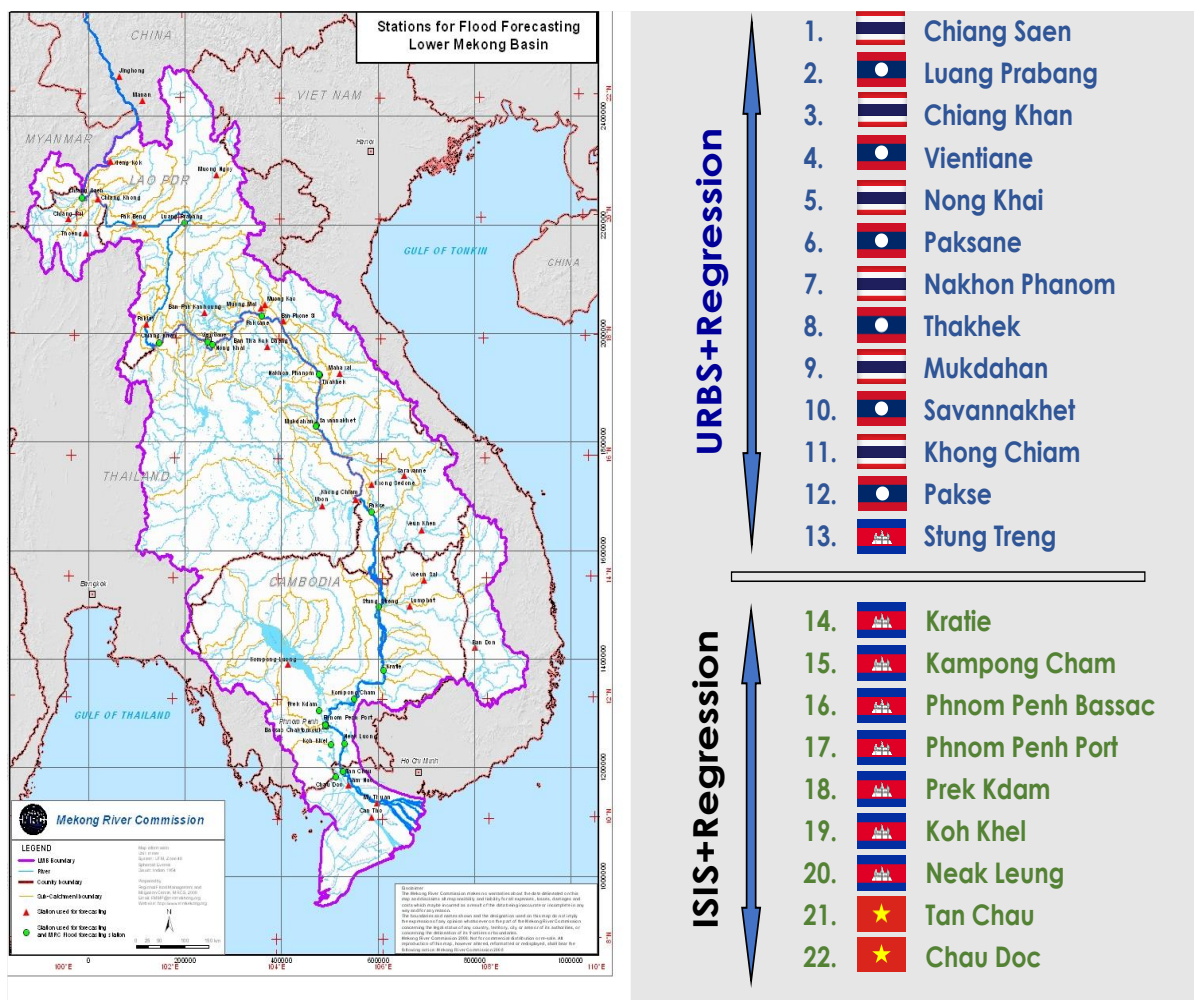


Figure 6. Key stations and model application for River Monitoring and Flood Forecasting.

According to MRC’s observed water level data, the outflows at Jinhong hydrological station showed slightly increase over the monitoring period from 17 to 23 August 2021. It was rising about 0.26 m from 535.26 metres (m) on August 17 to 535.52 m on August 23. The outflows increased from 825 cubic metres per second (m³/s) on August 17 to 997 m³/s on August 23. [Figure 7](#) below presents water level fluctuations at the Jinhong hydrological station¹, showing the trend of water level from 17 to 23 August 2021 are close to its minimum level.

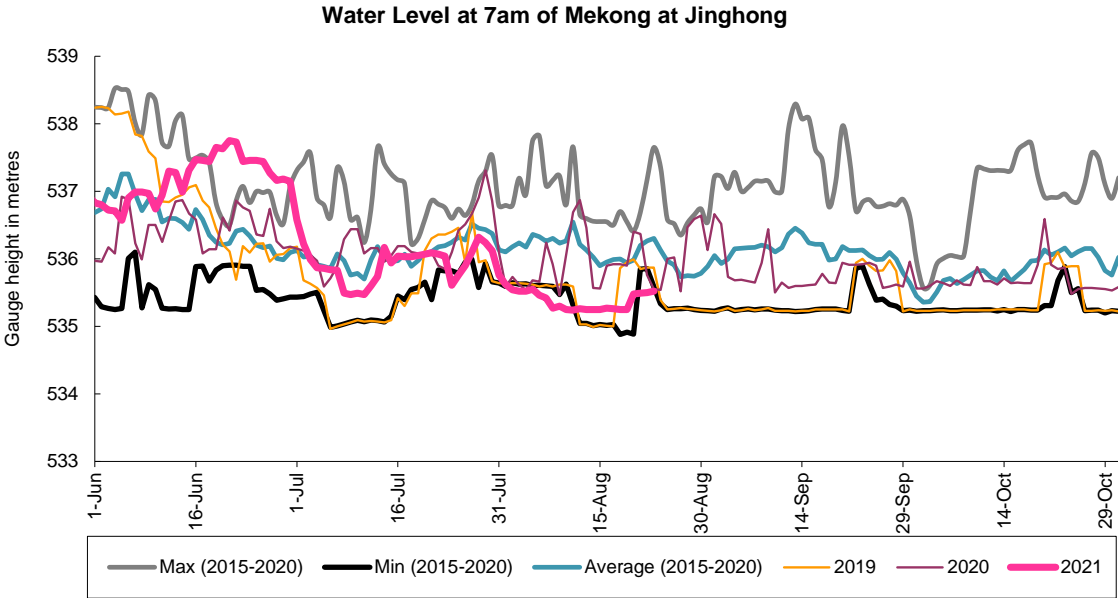


Figure 7. Water level at the Jinhong hydrological station during 1 July-23 Aug 2021.

Amid the significantly low outflow from Jinhong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Paksane in Lao PDR increased during August 17-23 due to average rainfall in some parts of the LMB. However, water levels from Nakhon Phanom in Thailand to Pakse were even lower than their historical minimum level. 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 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 17 to 23 August 2021 at Thailand’s Chiang Saen slightly increased from 3.88 metres (m) to 4.10 m, showing an increase of 0.22 m but was still about 1.88 m lower than

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

its LTA. Similarly, the water level at Luang Prabang station in Lao PDR also increased from 11.18 m to 11.22 m during the reporting period. This level shows 1.83 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 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.**

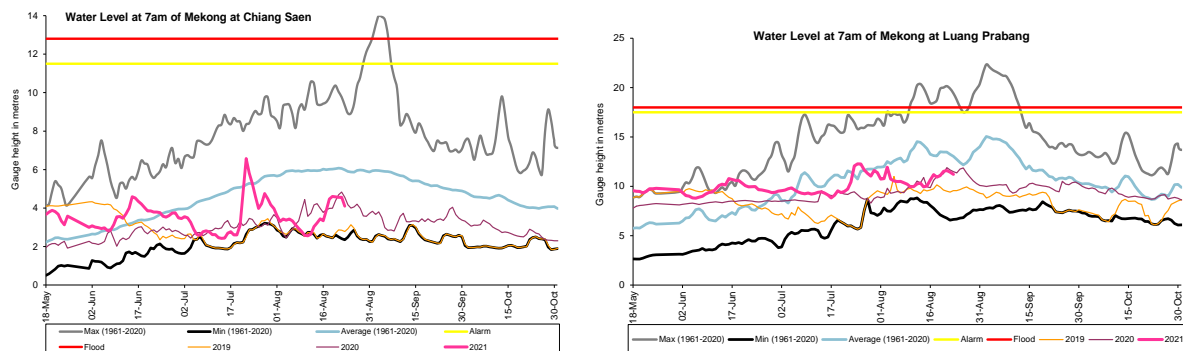


Figure 8. Water levels at Chiang Saen in Thailand and Luang Prabang in Lao PDR.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water level at Chiang Khan in Thailand (downstream of the Xayaburi dam) increased from 7.87 m to 9.30 m during the reporting week. Nonetheless, this increase still showed 2.33 m lower than its Long-Term- Average (LTA). The water level downstream at Vientiane in Lao PDR followed the upstream trend. It grew from 4.74 m to 6.60 m and was about 2.12 m lower than its LTA during Aug 17-23. At Nong Khai station in Thailand, the water level increased during the reporting period. It was up about 1.97 m, significantly increasing from 4.58 m to 6.55 m but still showing 2.98 m lower than its LTA. Water level at Paksane in Lao PDR, on the other hand, slightly decreased by about 0.07 m, dropping from 7.28 m to 7.21 m. The WL at this station was still about 3.86 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.

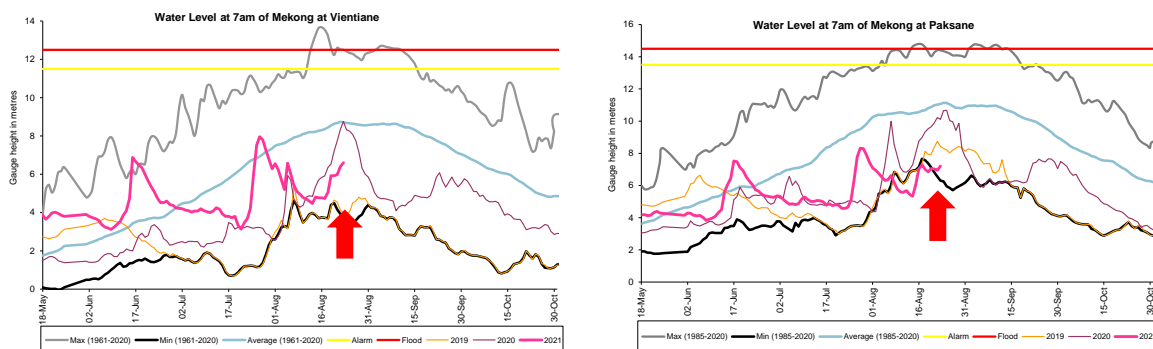


Figure 9. Water levels Veintiane and Paksane in Lao PDR.

Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand and Thakhek in Lao PDR significantly dropped about 0.96 m due to low rainfall and inflow from upstream, while from Mukdahan in Thailand to Pakse in Lao PDR decreased about 0.15 m. **Water levels at these stations are about 0.95 m lower than their minimum level, which considered very critical.** [Figure 10](#) shows the water levels at Nakhon Phanom and Pakse stations.

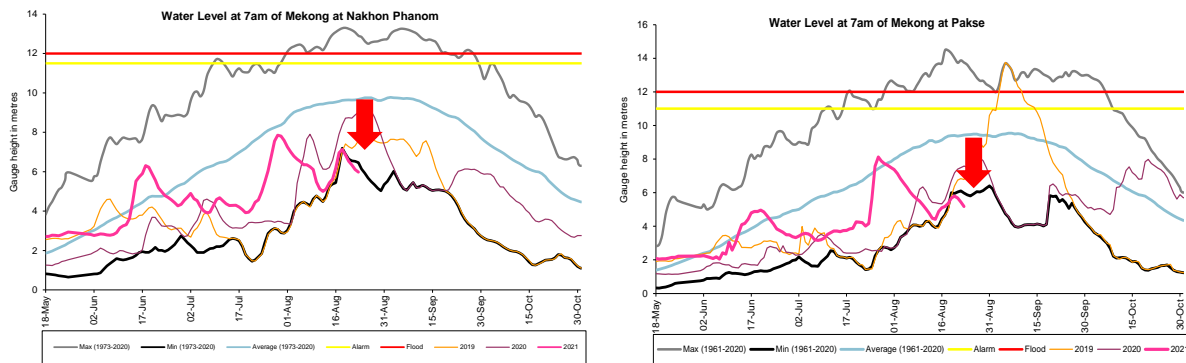


Figure 10. Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR

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

Due to above-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 went up during 17-23 August 2021. This week water level at Stung Treng and Kratie increased about 0.66 m and 0.71 m, respectively, showing about 2.75 m lower than their LTA (see [Figure 11](#)). The water level at Kompong Cham increased about 0.31 m and stayed 0.07 m lower than its minimum value. **Water levels at these stations are stay close to their minimum levels, which considered very critical.**

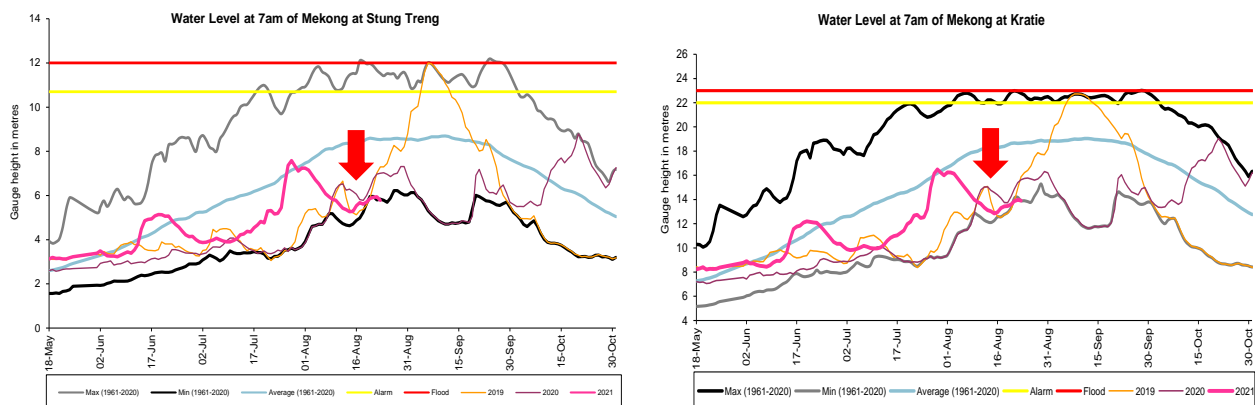


Figure 11. Water levels at Stung Treng and Kratie on the Mekong River.

At Chaktomuk on the Bassac River, the water level increased by about 0.37 m and stayed 0.09 m higher than its minimum value; while at Koh Khel, water level went down 0.35 m, staying 0.45 m lower than its minimum value. The water level at Prek Kdam on the Tonle Sap Lake

increased about 0.40 m and was about 0.23 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 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 17 to 23 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 1.02 m and 1.30 m; they were in the range of their LTA and historical minimum levels and considered normal.

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 23 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.

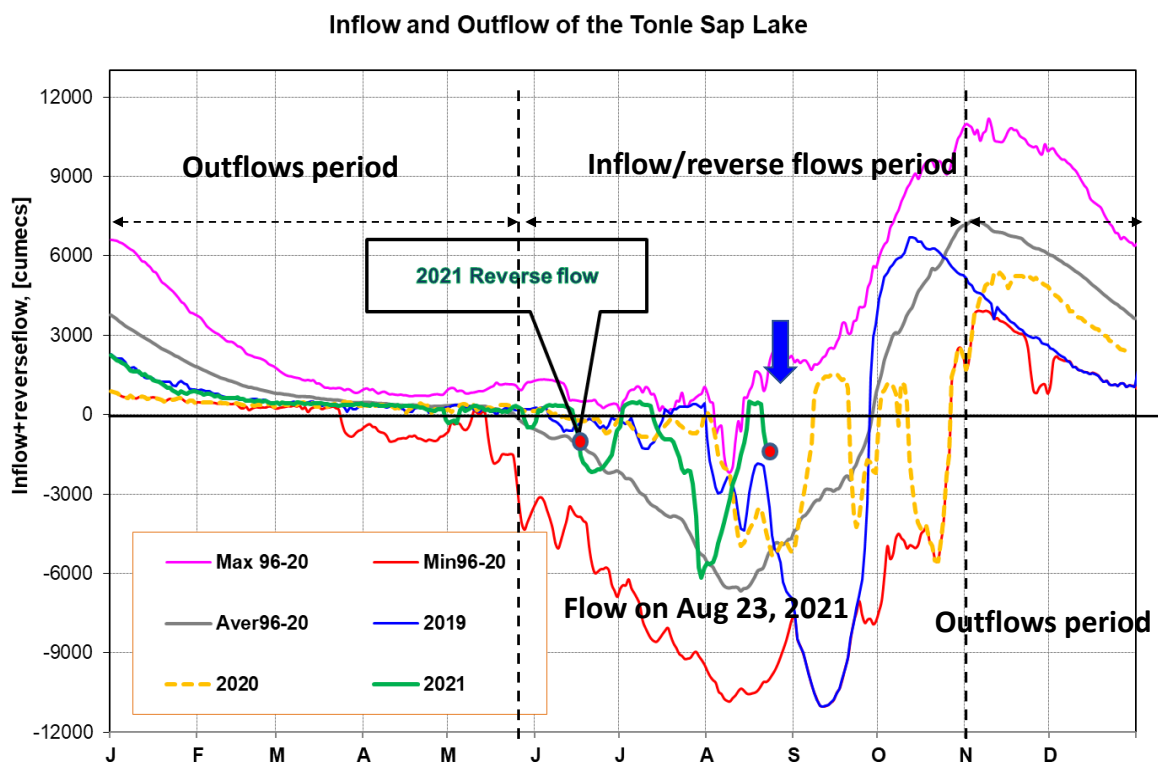


Figure 12. Seasonal change of inflows and outflows of Tonle Sap Lake

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 23 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 23, **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.

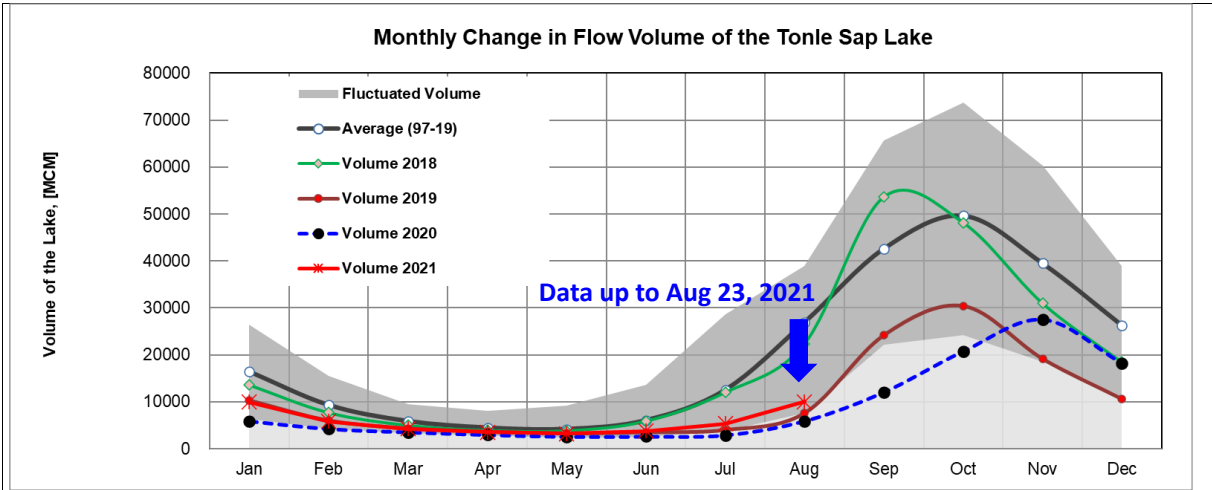


Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.

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	10031.52
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


From August 17-23, the LMB was affected by the low-pressure cell which was covering the upper part of Viet Nam; the low-pressure cell was associated with the south-easterly wind which prevailed over the Gulf of Thailand, eastern and lower north-eastern parts of the LMB on the first day of the week. These conditions caused moderate and heavy rainfall in the upper part of the LMB during the monitoring 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, especially in northern Viet Nam ranging from low to high level, as shown in [Figure 14](#) and [Table 2](#).

Table 2. Detected flash flood in Thailand, Lao PDR, Cambodia, and Viet Nam on August 18.

 Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Thailand															
Date of FFG products 18/08/2021 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
Prachinburi	Muang Prachinburi	Eastern	Low-Risk	Prachinburi	Muang Prachinburi	Eastern	Low-Risk	Chanthaburi	Pong Nam Ron	Eastern	Low-Risk				
Kanchanaburi	Thong Pha Phum	Central	Low-Risk	Kanchanaburi	Thong Pha Phum	Central	Low-Risk	Udon Thani	Na Yung	Northeastern	Low-Risk				
								Chaiyaphum	Nong Bua Daeng	Northeastern	Low-Risk				
								Trad	Muang Trat	Eastern	Low-Risk				
								Tak	Tha Song Yang	Northern	Low-Risk				
								Tak	Mae Ramat	Northern	Low-Risk				
								Tak	Mae Sot	Northern	Low-Risk				
								Tak	Mae Sot	Northern	Low-Risk				
								Chiang Mai	Omkoi	Northern	Low-Risk				
								Chiang Mai	Omkoi	Northern	Low-Risk				
								Chiang Mai	Omkoi	Northern	Low-Risk				
								Chiang Mai	Omkoi	Northern	Low-Risk				
								Nakhon Nayok	Pak Phli	Eastern	Low-Risk				
								Prachinburi	Muang Prachinburi	Eastern	Low-Risk				
								Tak	Ban Tak	Northern	Low-Risk				
								Phitsanulok	Chat Trakan	Northern	Low-Risk				
								Loei	Nahao	Northeastern	Low-Risk				
								Phetchabun	Muang Phetchabun	Northern	Low-Risk				
								Phetchabun	Muang Phetchabun	Northern	Low-Risk				
								Tak	Um Phang	Northern	Low-Risk				
								Tak	Um Phang	Northern	Low-Risk				
								Kanchanaburi	Thong Pha Phum	Central	Low-Risk				
								Phetchaburi	Nong Ya Plong	Central	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 18/08/2021 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
Huaphanh	Viengxay	TA-AN	Eastern	Low-Risk	Huaphanh	Viengxay	TA-AN	Eastern	Low-Risk	Vientiane	Thoulakho	NAM ANG	Northwest	Low-Risk
Xiengkhuang	Nonghed	DAN	Northeast	Low-Risk	Xiengkhuang	Nonghed	DAN	Northeast	Low-Risk	Phongsaly	Nhot ou	PHOUNEUSANE	North	Low-Risk
										Luangprabang	Phonxay	PHOUNGONG	North	Low-Risk
										Luangprabang	Viengkham	NAVAEN	North	Low-Risk
										Luangprabang	Viengkham	NONGKHAM	North	Low-Risk
										Luangprabang	Phonxay	HUAYPOTE	North	Low-Risk
										Huaphanh	Viengthon	HUAYSA	Eastern	Low-Risk
										Huaphanh	Xamtay	HINTANG	Eastern	Low-Risk
										Huaphanh	Xamtay	HOUAYSAMONG	Eastern	Low-Risk
										Huaphanh	Viengthon	PHONXONG	Eastern	Low-Risk
										Huaphanh	Viengthon	HOUAYMAKFAY	Eastern	Low-Risk
										Huaphanh	Xamneua	SATHORN	Eastern	Low-Risk
										Huaphanh	Viengxay	TA-AN	Eastern	Low-Risk
										Huaphanh	Huameuang	KADAENG	Eastern	Low-Risk
										Xiengkhuang	Nonghed	DAN	Northeast	Low-Risk

 Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Cambodia														
Date of FFG products 18/08/2021 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
Koh Kong	Thma Bang	Toap Khley	Southwestern	Low-Risk	Koh Kong	Thma Bang	Toap Khley	Southwestern	Low-Risk	Kampong Chhnang	Kampong Leang	Kandal	Central	Low-Risk
										Kampong Cham	Stueng Trang	Sampieng Kraom	Central Lowland	Low-Risk
										Kampong Thom	Baray	Kokr Thum	Northwest	Low-Risk
										Tboung Khmum	Memot	Kantbot	Central Lowland	Low-Risk
										Tboung Khmum	Memot	Chankar Thmei	Central Lowland	Low-Risk
										Koh Kong	Thma Bang	Toap Khley	Southwestern	Low-Risk
										Koh Kong	Botum Sakor	Andoung Tuek	Southwestern	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 18/08/2021 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
Binh Duong	TX. Thu Dau Mot	Southeast	Low-Risk	Long An	Can Giuoc	Southeast-Mekong River Delta	Low-Risk	Binh Duong	TX. Thu Dau Mot	Southeast	Low-Risk
Long An	Can Giuoc	Southeast-Mekong River Delta	Low-Risk	Binh Phuoc	Phuoc Long	Southeast	Low-Risk	Long An	Can Giuoc	Southeast-Mekong River Delta	Low-Risk
Long An	Can Duoc	Southeast-Mekong River Delta	Low-Risk	Long An	Thu Thua	Southeast-Mekong River Delta	Low-Risk	Long An	Can Duoc	Southeast-Mekong River Delta	Low-Risk
Binh Phuoc	Phuoc Long	Southeast	Low-Risk	Lao Cai	Bat Xat	Northwest	Moderate-Risk	Binh Duong	Thuan An	Southeast	Low-Risk
Dong Thap	Thap Muoi	Southeast-Mekong River Delta	Low-Risk	Hoa Binh	Da Bac	Northwest	Low-Risk	Binh Phuoc	Phuoc Long	Southeast	Low-Risk
Long An	Tan Thanh	Southeast-Mekong River Delta	Low-Risk	Lao Cai	Sa Pa	Northwest	Moderate-Risk	Dong Nai	Xuan Loc	Southeast	Low-Risk
Long An	Thu Thua	Southeast-Mekong River Delta	Low-Risk	Lao Cai	Than Uyen	Northwest	Low-Risk	Long An	Duc Hoa	Southeast-Mekong River Delta	Low-Risk
An Giang	Cho Moi	Southeast-Mekong River Delta	Low-Risk	Lai Chau	Sin Ho	Northwest	Low-Risk	Dong Thap	Thap Muoi	Southeast-Mekong River Delta	Low-Risk
Lao Cai	Bat Xat	Northwest	High-Risk	Yen Bai	Tram Tau	Northwest	Low-Risk	Tay Ninh	Tan Bien	Southeast	Low-Risk
Yen Bai	Mu Cang Chai	Northwest	Low-Risk	Son La	Bac Yen	Northwest	Low-Risk	Long An	Tan Thanh	Southeast-Mekong River Delta	Low-Risk
Son La	Bac Yen	Northwest	Low-Risk	Son La	Moc Chau	Northwest	Low-Risk	Long An	Thu Thua	Southeast-Mekong River Delta	Low-Risk
Hoa Binh	Da Bac	Northwest	Low-Risk	Son La	Phu yen	Northwest	Low-Risk	Long An	Thu Thua	Southeast-Mekong River Delta	Low-Risk
Lao Cai	Sa Pa	Northwest	Moderate-Risk	Ha Giang	Hoang Su Phi	Northeast	Low-Risk	An Giang	Cho Moi	Southeast-Mekong River Delta	Low-Risk
Lao Cai	Than Uyen	Northwest	Moderate-Risk	Ha Giang	Xin Man	Northeast	Low-Risk	Cao Bang	Hoa An	Northeast	Low-Risk
Son La	Muong La	Northwest	Low-Risk	Tuyen Quang	Na Hang	Northeast	Low-Risk	Cao Bang	Nguyen Binh	Northeast	Low-Risk
Lai Chau	Sin Ho	Northwest	Low-Risk	Bac Kan	Ba Be	Northeast	Low-Risk	Quang Ninh	TX. Cam Pha	Northeast	Low-Risk
Yen Bai	Tram Tau	Northwest	Low-Risk	Ha Giang	Bac Quang	Northeast	Low-Risk	Hai Phong	An Hai	Red River Delta	Low-Risk
Son La	Moc Chau	Northwest	Low-Risk	Lao Cai	Bao Yen	Northwest	Low-Risk	Lao Cai	Bat Xat	Northwest	Moderate-Risk
Son La	Phu yen	Northwest	Low-Risk	Son La	Yen Chau	Northwest	Low-Risk	Lao Cai	Van Ban	Northwest	Low-Risk
Ha Giang	Hoang Su Phi	Northeast	Low-Risk	Thanh Hoa	Muong Lat	North Central	Low-Risk	Son La	Bac Yen	Northwest	Low-Risk
Ha Giang	Xin Man	Northeast	Low-Risk					Hoa Binh	Da Bac	Northwest	Low-Risk
Lao Cai	Bao Yen	Northwest	Low-Risk					Hoa Binh	Da Bac	Northwest	Low-Risk
Tuyen Quang	Na Hang	Northeast	Low-Risk					Lao Cai	Sa Pa	Northwest	Moderate-Risk
Ha Giang	Bac Quang	Northeast	Low-Risk					Lao Cai	Than Uyen	Northwest	Moderate-Risk
Bac Kan	Ba Be	Northeast	Low-Risk					Yen Bai	Mu Cang Chai	Northwest	Low-Risk
Ha Giang	Bac Quang	Northeast	Low-Risk					Son La	Muong La	Northwest	Low-Risk

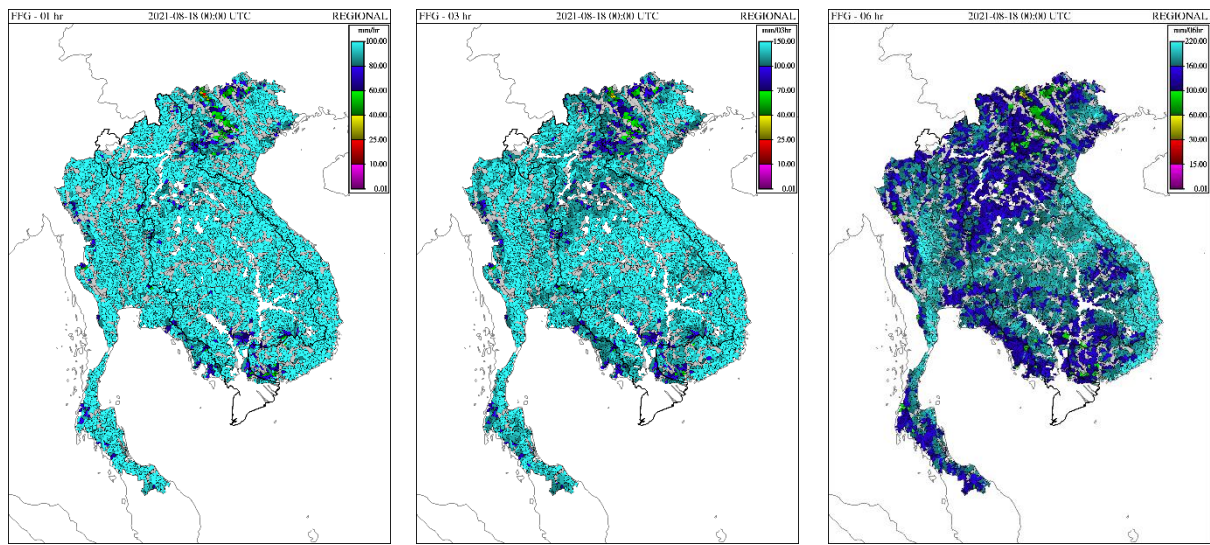


Figure 14. Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on August 18.

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from 14 to 20 August 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 14 to 20, as shown in [Figure 15](#), shows that the LMB was experiencing moderate and severe meteorological droughts mainly in central part and the lower ridge of the region. In the central part drought occurred in Thailand's Nong Bua Lamphu, Udon Thani, Sakon Nakhon, Muk Dahan, Kalasin, Khon Kaen, Chaiyaphum, Nakhon Ratchasima, Burirum, Maha Sarakham, Surin, Roi Et, Yasothon, Amnat Charoen, and Ubon Ratchathani; while in the southern part, drought took place in Viet Nam's Tien Giang, Ben Tre, Tra Vinh, Soc Trang, and Bac Lieu. The situation was slightly better than the previous week (Aug 7-13).

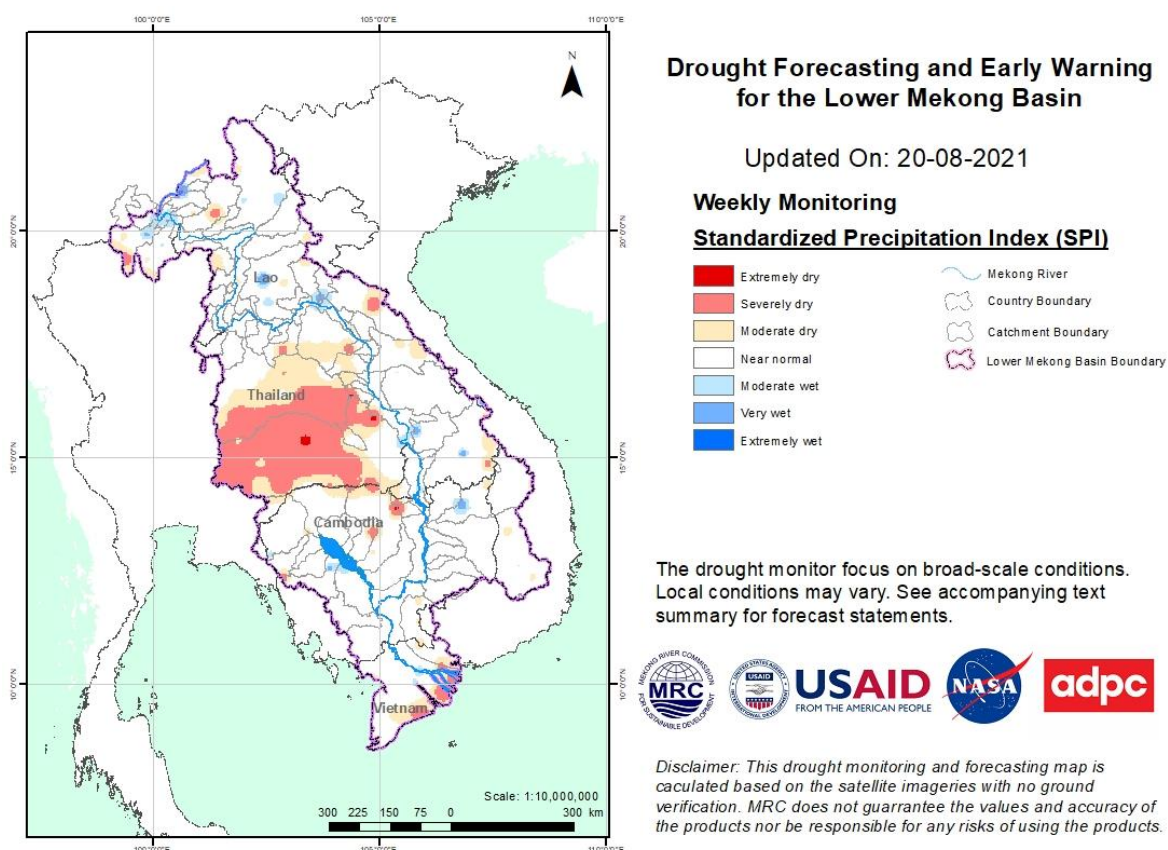


Figure 15. Weekly standardized precipitation index from 14 to 20 Aug 2021.

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

Soil water fraction from August 14 to 20, as displayed in [Figure 16](#), shows that the LMB region was mostly wet in the upper and lower parts. The only moderate and severe dry soil moistures took place in Savannakhet and Khammuane of Lao PDR as well as Dak Lak of Viet Nam. No significant agricultural drought threat found during the reporting period.

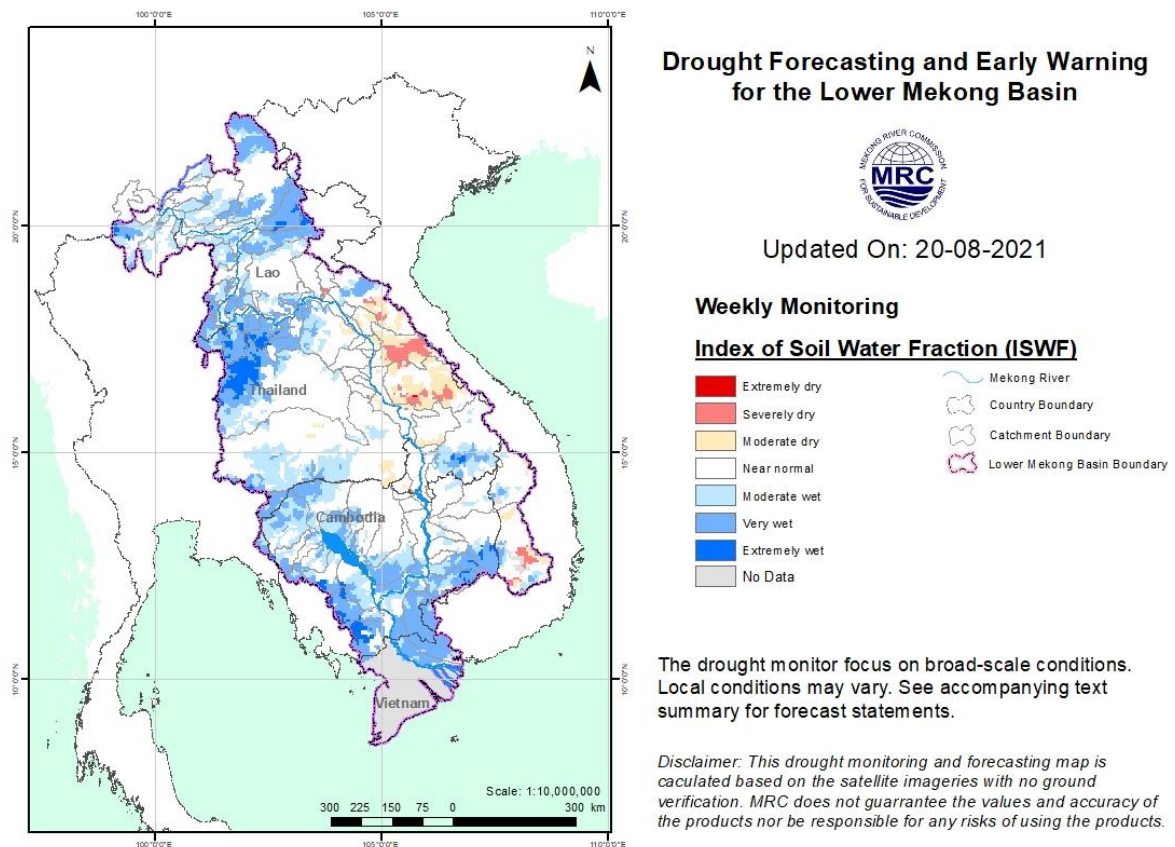


Figure 16. Weekly Soil Moisture Anomaly from 14 to 20 August 2021.

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

The situation was getting better in the monitoring week during August 14-20. The combined drought indicator shows no significant threat in the region amid some meteorological droughts in the middle part of the LMB, as displayed in [Figure 17](#) below.

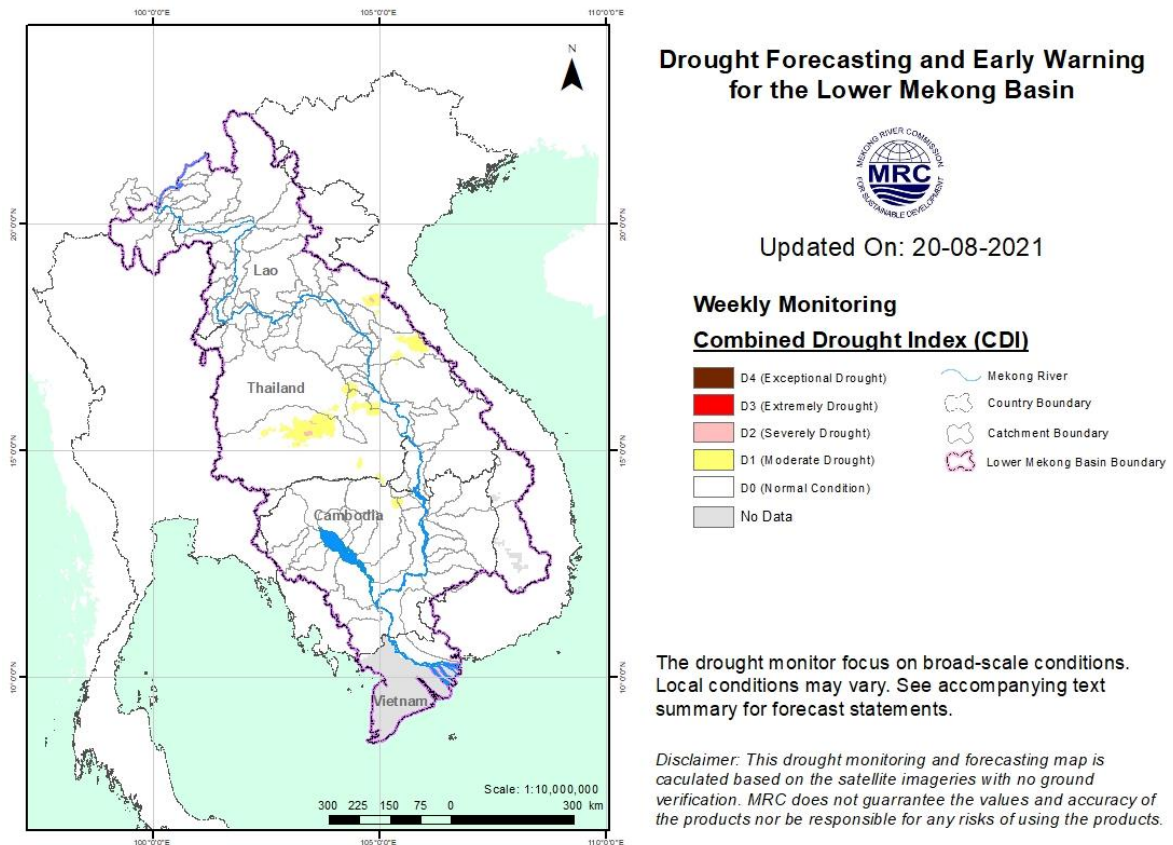


Figure 17. Weekly Combined Drought Index from 14 to 20 August 2021.

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.

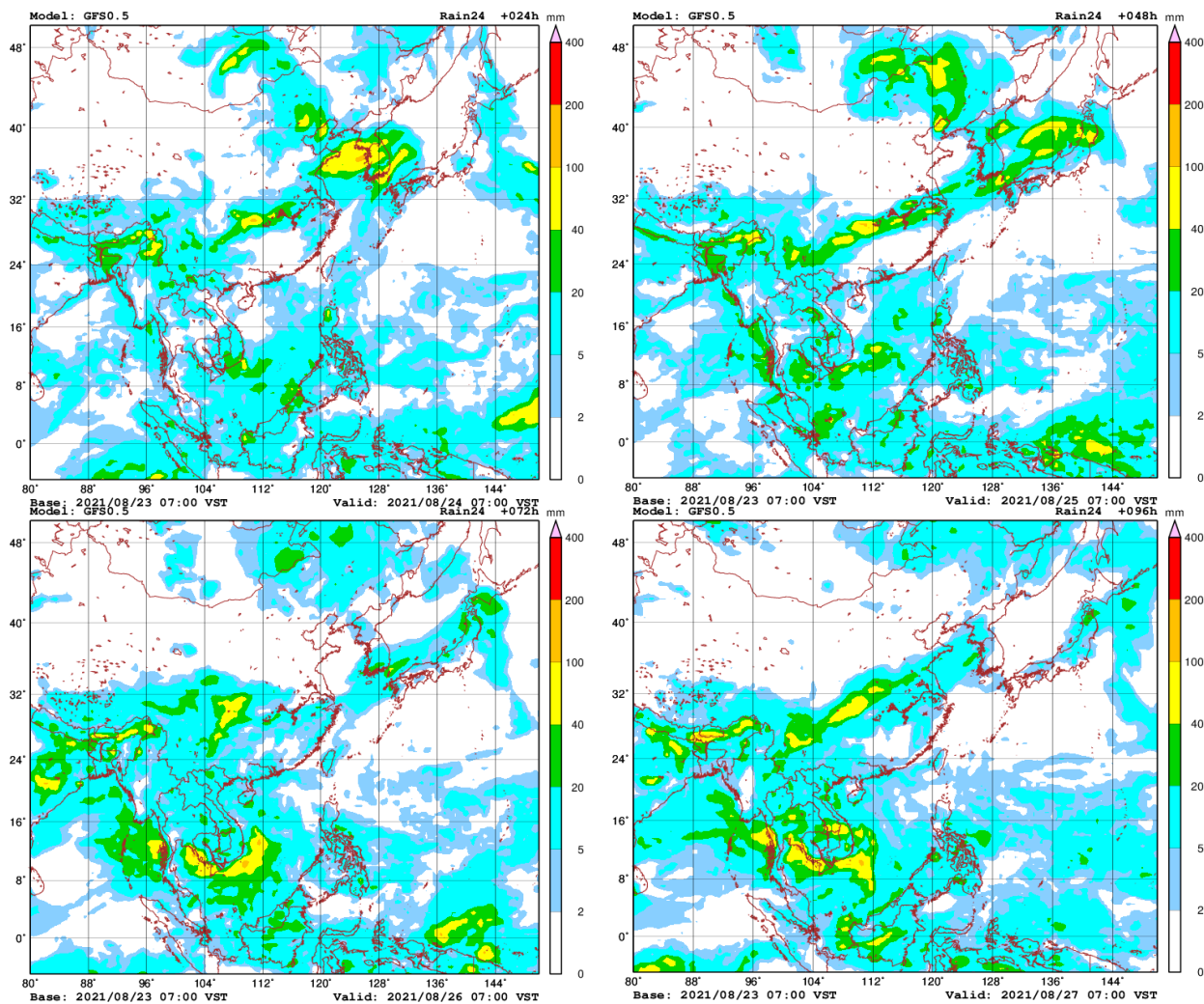
6 Weather and Water Level Forecast and Flash Flood Information

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 24 – 25, small rainfall (0 -20 mm/24h) will likely occur in the LMB. From August 26 – 30, moderate rainfall (20 – 40 mm/24h) and heavy rain (50 – 100 mm/24h) will likely occur in some areas of the southwest Cambodia on the Gulf of Thailand and in southern part of Viet Nam.

[Figure 18](#) shows accumulated rainfall forecast (24 h) of the GFS model from August 24-30.



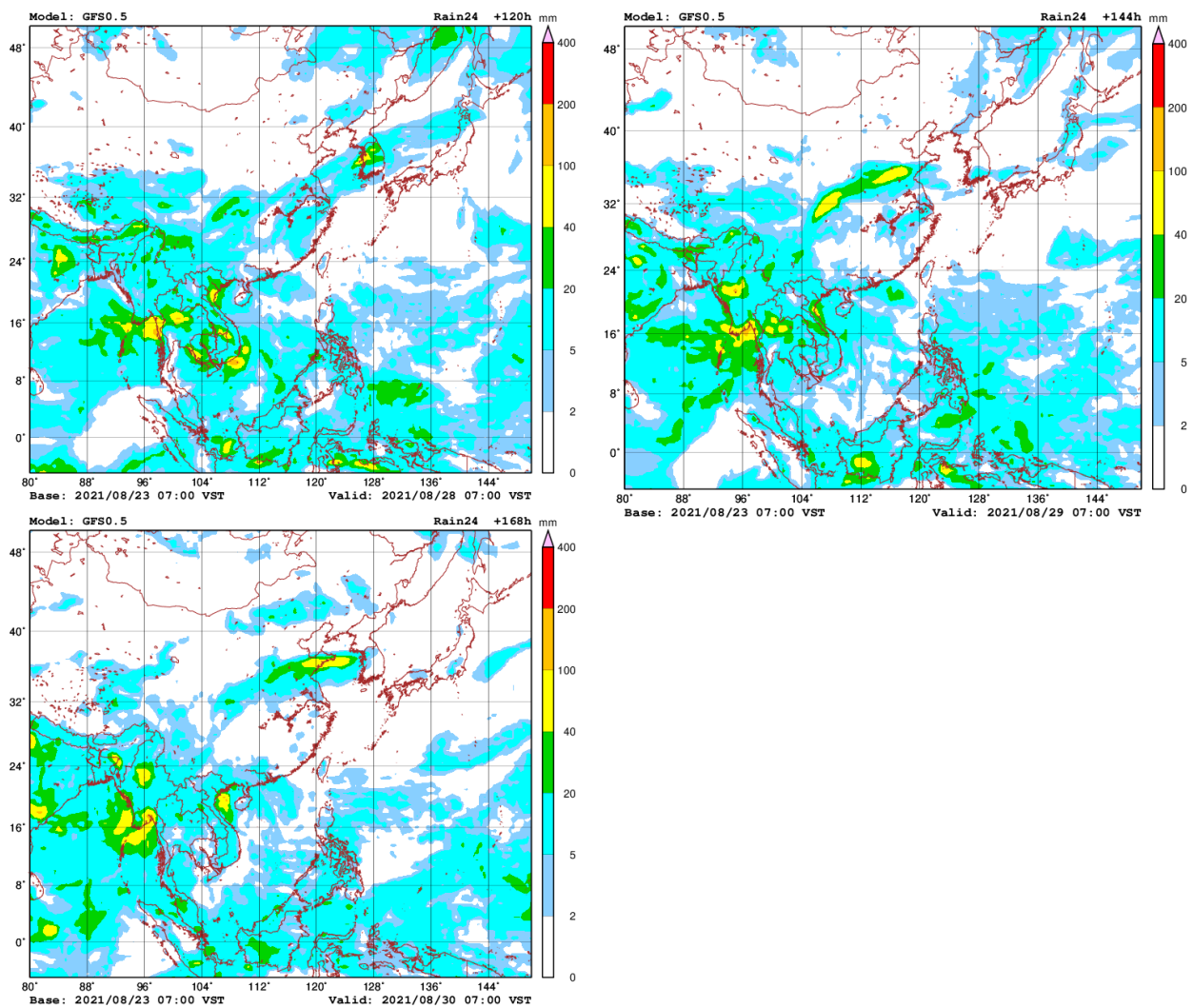


Figure 18. Accumulated rainfall forecast (24 h) based on a GFS model.

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on August 23's daily flood forecasting bulletin, the daily forecasted water level at Chiang Saen in Thailand is expected to slightly increase from 4.10 m to 4.18 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 decrease from 11.22 m to 10.59 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 drop about 0.57 m, while water level at Vientiane in Lao PDR will also decrease about 0.57 m. Furthermore, from Nong Khai in Thailand, the water level will decrease about 0.55 m over the next five days, but water level at Paksane in Lao PDR will increase about 0.60 m due to the forecasted heavy rain 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 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 0.20 m and 0.50 m over the next five days. 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 down from 0.05 m to 0.20 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 0.20 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 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 17 to 23 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.

6.3 Flash Flood Information

With some forecasted rainfall for next week which is reflected in the section [6.1](#), high level flash floods are expected to take place in the LMB. 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.

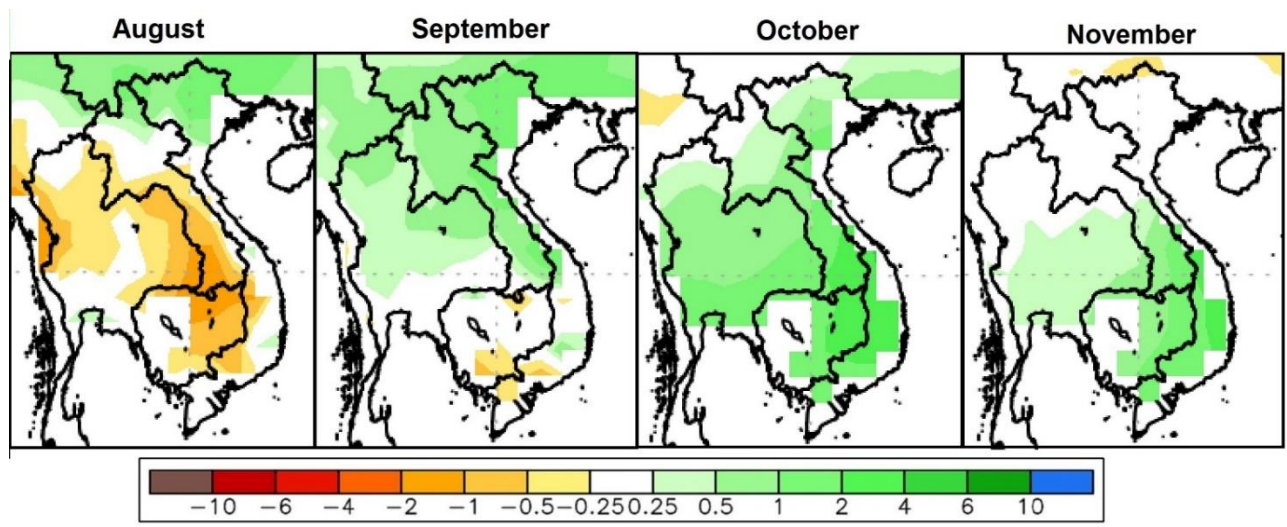


Figure 19. Daily average of monthly rainfall anomaly forecast from August to November 2021.

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: 24 August - 28 August 2021

Date: 23 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									
						22-Aug	23-Aug	24-Aug	25-Aug	26-Aug	27-Aug	28-Aug	23	24	25	26	27	28				
Jinghong		0.0				535.50	535.52											X	X	X	X	X
Chiang Saen		0.0	357.110	12.80	11.50	4.56	4.10	4.01	4.06	4.08	4.12	4.18		↓								
Luang Prabang		0.0	267.195	18.00	17.50	11.44	11.22	11.07	10.60	10.50	10.55	10.59		↓	↓	↓						
Chiang Khan		0.0	194.118	16.00	14.50	9.49	9.30	9.10	9.00	8.75	8.68	8.73		↓	↓		↓					
Vientiane		0.0	158.040	12.50	11.50	6.40	6.60	6.51	6.36	6.30	6.13	6.08		↑		↓						
Nongkhal		0.0	153.648	12.20	11.40	6.22	6.55	6.45	6.29	6.22	6.05	6.00		↑		↓						
Paksane		100.5	142.125	14.50	13.50	6.95	7.21	7.61	7.72	7.80	7.85	7.90		↑	↑	↑						
Nakhon Phanom		31.4	130.961	12.00	11.50	6.11	5.98	6.16	6.39	6.44	6.48	6.50		↓	↑	↑						
Thakhek		36.9	129.629	14.00	13.00	7.25	7.09	7.28	7.53	7.60	7.66	7.70		↓	↑	↑						
Mukdahan		0.0	124.219	12.50	12.00	6.00	5.75	5.60	5.73	5.91	5.96	6.00		↓	↓	↑	↑					
Savannakhet		0.0	125.410	13.00	12.00	4.42	4.15	4.07	4.17	4.31	4.34	4.38		↓			↑					
Khong Chiam		2.2	89.030	14.50	13.50	6.92	6.66	6.45	6.30	6.47	6.70	6.78		↓	↓	↓	↑	↑				
Pakse		29.8	86.490	12.00	11.00	5.44	5.18	5.00	4.92	5.06	5.25	5.30		↓	↓	↓	↑	↑				
Stung Treng		1.5	36.790	12.00	10.70	5.94	5.78	5.65	5.52	5.47	5.57	5.72		↓	↓	↓					↑	↑
Kratie		nr	-0.101	23.00	22.00	13.97	13.91	13.71	13.55	13.40	13.35	13.46		↓	↓	↓	↓	↓				↑
Kompong Cham		nr	-0.930	16.20	15.20	8.08	8.16	8.10	7.93	7.83	7.80	7.89		↑	↓	↓	↓	↓				↑
Phnom Penh (Bassac)		nr	-1.020	12.00	10.50	4.62	4.73	4.76	4.73	4.73	4.75	4.80		↑	↑	↓						↑
Phnom Penh Port		-	0.070	11.00	9.50	3.65	3.75	3.78	3.76	3.78	3.81	3.87		↑	↑							↑
Koh Khel (Bassac)		nr	-1.000	8.40	7.90	4.33	4.41	4.43	4.42	4.41	4.43	4.47		↑								↑
Neak Luong		nr	-0.330	8.00	7.50	3.21	3.27	3.31	3.29	3.23	3.20	3.20		↑	↑		↓	↓				
Prek Kdam		nr	0.080	10.00	9.50	3.72	3.82	3.86	3.84	3.85	3.88	3.95		↑	↑							↑
Tan Chau		0.0	0.000	4.50	3.50	1.48	1.30	1.20	1.14	1.08	1.05	1.02		↓	↓	↓	↓	↓				↓
Chau Doc		nr	0.000	4.00	3.00	1.50	1.26	1.08	0.99	0.90	0.85	0.80		↓	↓	↓	↓	↓				↓

REMARKS:

nr: no rain.

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

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 17-23, including the lower part in Cambodia and Viet Nam, varying from 3.60 mm to 169.90 mm, considered low compared with last week.

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 24 to 29 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 17 to 23 August 2021. It was rising about 0.26 m from 535.26 metres (m) on August 17 to 535.52 m on August 23. The outflows increased from 825 m³/s on August 17 to 997 m³/s on August 23.

Amid the significantly low outflow from Jinghong upstream, water levels across most monitoring stations from Chiang Saen in Thailand to Paksane in Lao PDR increased during August 17-23 due to average rainfall in some parts of the LMB. However, water levels from Nakhon Phanom in Thailand to Pakse were even lower than their historical minimum level. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia, on the other hand, went up following 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 drop 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 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](#), major flash floods are expected in the LMB during next week.

7.4 Drought condition and its forecast

The drought situation was getting better in the monitoring week during August 14-20. The combined drought indicator shows no significant threat in the region amid some meteorological droughts in the middle part of the LMB.

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.

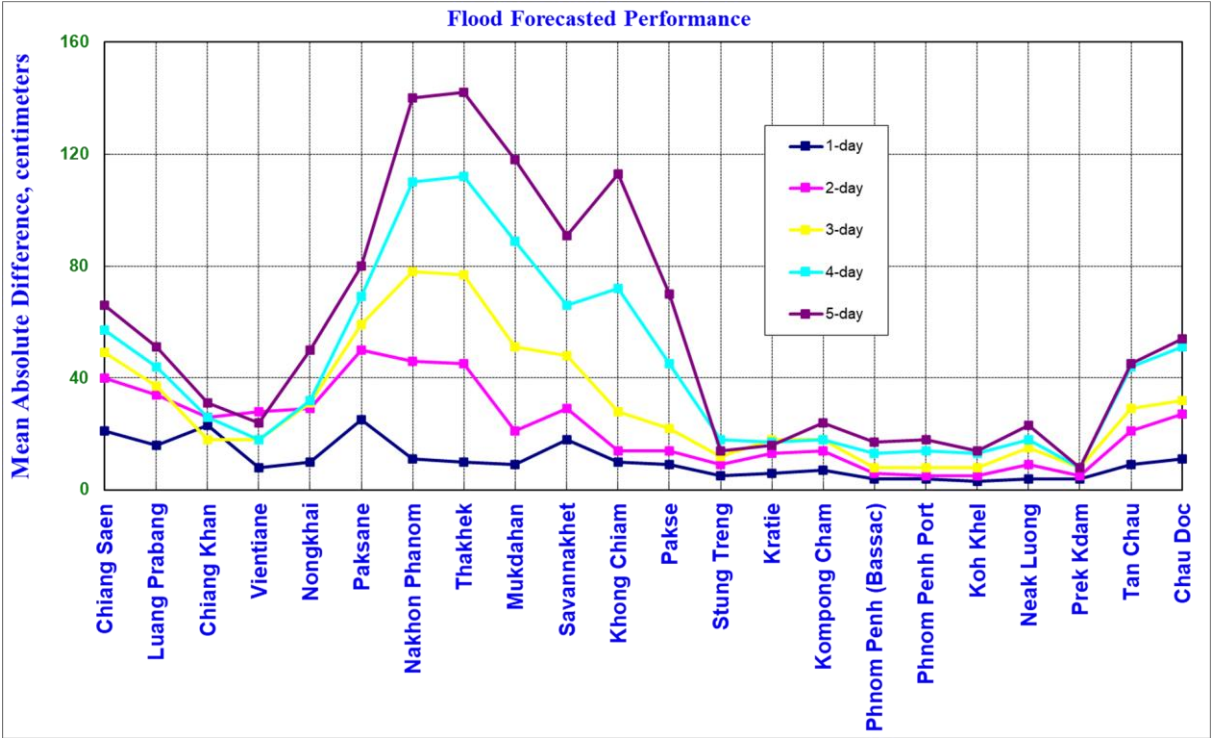
Annex 1: Performance of the weekly flood forecasting

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 17 to 23 August 2021.

The forecasting values from 17 to 23 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 17 to 23 August, 2021.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 17-23 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 Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	<u>21</u>	16	<u>23</u>	8	10	<u>25</u>	11	10	9	18	10	9	5	6	7	4	4	3	4	4	9	11
2-day	<u>40</u>	<u>34</u>	<u>26</u>	<u>28</u>	<u>29</u>	<u>50</u>	<u>46</u>	<u>45</u>	<u>21</u>	<u>29</u>	14	14	9	13	14	6	5	5	9	5	<u>21</u>	<u>27</u>
3-day	<u>49</u>	<u>37</u>	18	18	<u>31</u>	59	78	77	51	<u>48</u>	<u>28</u>	<u>22</u>	12	18	18	8	8	8	15	8	<u>29</u>	<u>32</u>
4-day	57	<u>44</u>	<u>26</u>	18	<u>32</u>	69	110	112	89	66	72	<u>45</u>	18	17	18	13	14	13	18	8	<u>44</u>	51
5-day	66	51	<u>31</u>	<u>24</u>	<u>50</u>	80	140	142	118	91	113	70	14	16	<u>24</u>	17	18	14	<u>23</u>	8	<u>45</u>	54

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 17-23 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 Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	Average	
1-day	57.1	71.4	<u>42.9</u>	85.7	57.1	71.4	71.4	71.4	57.1	71.4	57.1	<u>42.9</u>	57.1	57.1	71.4	71.4	71.4	71.4	<u>42.9</u>	57.1	71.4	57.1	57.1	63.0
2-day	<u>50.0</u>	83.3	<u>50.0</u>	66.7	66.7	<u>50.0</u>	<u>33.3</u>	<u>33.3</u>	<u>50.0</u>	66.7	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	66.7	83.3	83.3	<u>33.3</u>	<u>33.3</u>	<u>50.0</u>	<u>50.0</u>	<u>33.3</u>	<u>33.3</u>	53.8
3-day	<u>40.0</u>	<u>40.0</u>	60.0	60.0	60.0	60.0	<u>40.0</u>	<u>40.0</u>	<u>20.0</u>	<u>40.0</u>	<u>40.0</u>	60.0	<u>40.0</u>	80.0	<u>40.0</u>	60.0	60.0	60.0	<u>40.0</u>	60.0	60.0	<u>40.0</u>	<u>40.0</u>	50.0
4-day	75.0	<u>50.0</u>	75.0	<u>25.0</u>	<u>50.0</u>	<u>50.0</u>	<u>25.0</u>	<u>25.0</u>	<u>25.0</u>	<u>25.0</u>	<u>50.0</u>	<u>50.0</u>	<u>25.0</u>	<u>50.0</u>	<u>50.0</u>	75.0	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>	47.7
5-day	66.7	66.7	66.7	<u>33.3</u>	66.7	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	<u>33.3</u>	66.7	<u>33.3</u>	66.7	66.7	<u>33.3</u>	66.7	100.0	66.7	66.7	66.7	51.5

Table B3: Overview of performance indicators for the past 7 days from 17 to 23 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	
2021																					
<i>week</i>	10:17	00:00	-	-	08:15	07:10	07:01	08:33	08:15	08:31	07:01	08:16	0	0	0	170	58	15	1	53	
<i>month</i>	10:30	00:00	-	-	08:15	07:10	07:21	08:36	08:26	08:14	07:17	08:19	0	0	14	272	334	48	7	38	

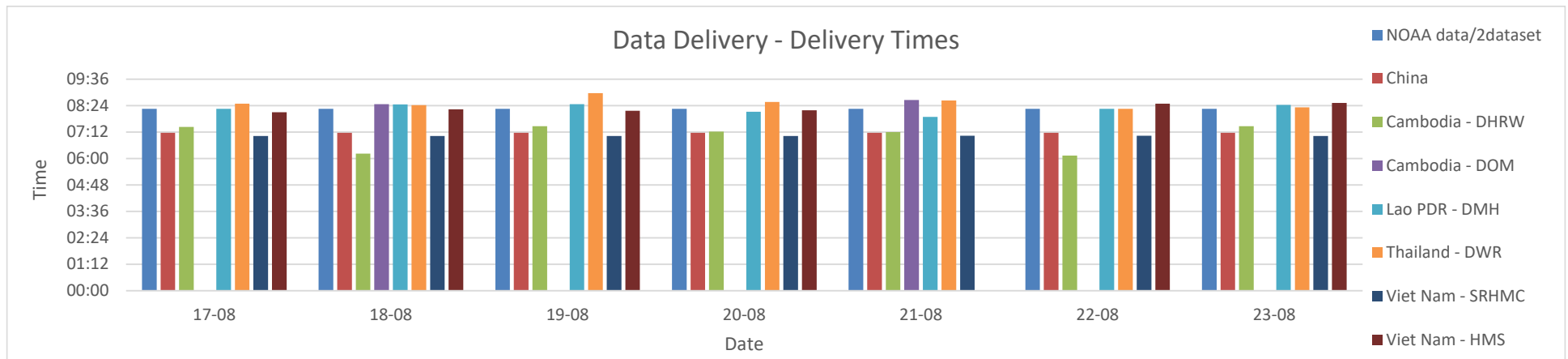


Fig. B4: Data delivery times for the past 7 days from 17 to 23 August 2021

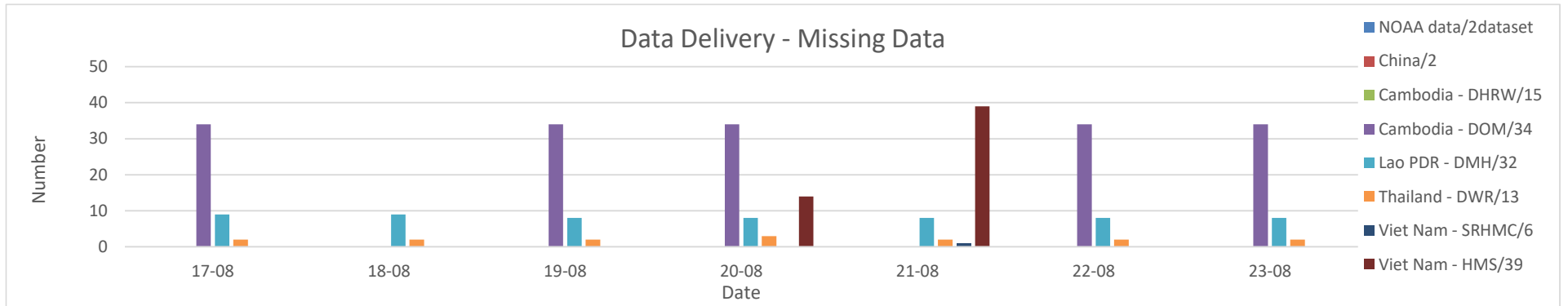


Fig. B5: Missing data for the past 7 days from 17 to 23 August 2021

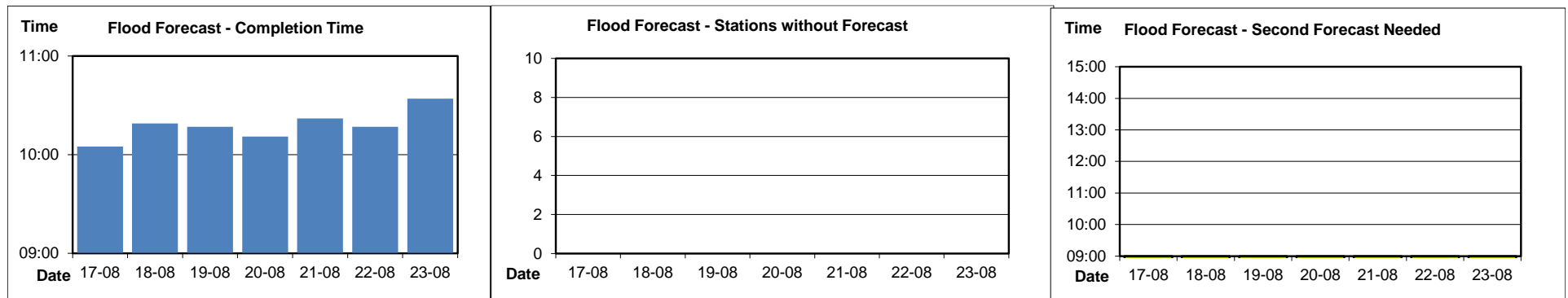


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 17 to 23 August 2021



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