



**Mekong River Commission**

# **Weekly Wet Season Situation Report in the Lower Mekong River Basin 21-27 September 2021**

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

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## Key Messages

Key messages for this weekly report are presented below.

### Rainfall and its forecast

- Rainfall focused in the areas from Chiang Saen in Thailand to Pakse in Lao PDR, including the lower part in Cambodia and Viet Nam, varying from 2.10 millimetres (mm) to 203.10 mm.
- There will be average rainfalls for the next 5 days over the Mekong region from 28 September to 4 October 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 a significant decrease over the monitoring period from 10 to 27 September 2021. It dropped **about 0.83 m from 535.98 m on 10 Sept to 535.15 on 27 Sept 2021 (recorded on 7:00 am)**. The outflows decreased from 1,318 m<sup>3</sup>/s on Sept 10 to 761 m<sup>3</sup>/s on Sept 27. From September 21 to 27, water level at this station went dropped 0.50 m and was about 0.04 m lower than its historical minimum value.
- Along with the significant low outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen in Thailand also decreased about 0.25 m from 21 to 27 September 2021. However, from Chiang Khan in Thailand to Vientiane in Lao PDR, water levels increased about 0.55 m during 21-27 September due to some average rainfall in the area and dam operation. Water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR were slightly increasing. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia were significantly increasing, due to heavy rainfall in 3S areas and following the same trend of the upstream flow (at Pakse).
- The water volume of the Tonle Sap Lake is lower than its LTA but higher than the levels in 2019 and 2020 during the same period.
- Over the next few days, the water levels across most monitoring stations are expected to slightly increase but remain lower than their long-term average value in most stations.

### Drought condition and its forecast

- Both meteorological and agricultural indicators show wet conditions over most parts of the LMB from September 18 to 24. The region did not face any drought threat during the monitoring period.
- For the upcoming three-month forecast, the LMB is likely to receive above average rainfall in September and October mainly in the central and southern parts of the region. Like 2020, the forecast shows that October is likely the wettest month of the year. November is forecasted to receive from average to above average rainfall throughout the LMB.

# 1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydrological and drought situation in the Lower Mekong River Basin (LMB) for the period from **21-27 September 2021**. The trend and outlook for water levels are also presented.

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

The report covers the following topics that are updated weekly:

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

Mekong River water levels are updated daily and can be accessed from:  
[http://ffw.mrcmekong.org/bulletin\\_wet.php](http://ffw.mrcmekong.org/bulletin_wet.php).

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

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

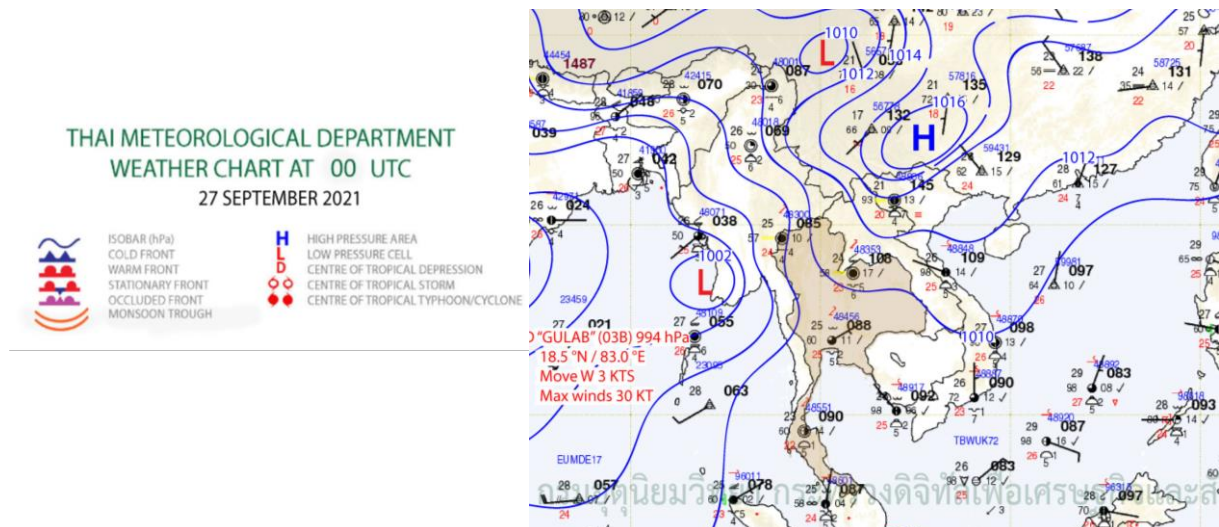


## 2 General Weather Patterns

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

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

[Figure 1](#) presents the weather map on 27 September 2021, showing no low-pressure line dominating the LMB. However, rainfall can be focused on the lower part of northern of Thailand, Lao PDR and Viet Nam and the 3S area (Sesan, Sre Pok, and Sekong) in Cambodia and Viet Nam.



**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 20 September to 3 October 2021, during the 3<sup>rd</sup> and 4<sup>th</sup> week of September. Nonetheless, LMB is likely dominated by wetter condition, which may receive more rainfall in general (above-average rainfall).

[Figure 2](#) shows the outlook of comparative wet conditions from 20 September to 3 October 2021 covering the whole LMB region, based on results from the NCEP model (National Centres for Environmental Prediction).

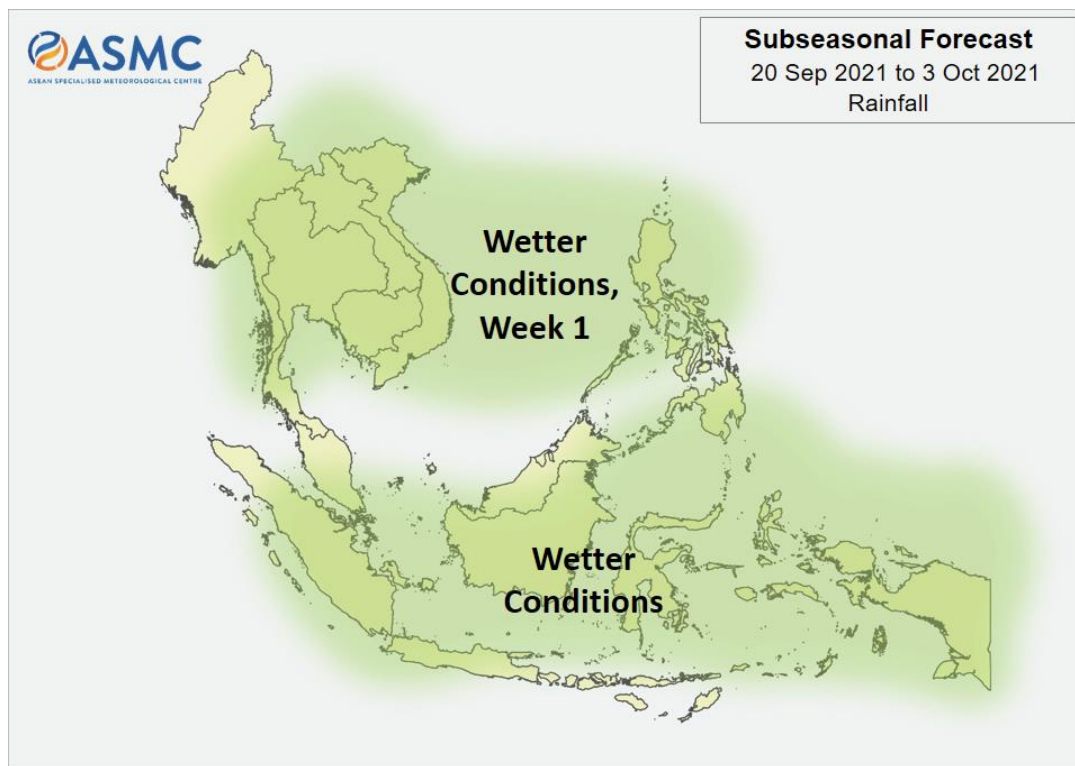


Figure 2. Outlook of wet and dry conditions over the Asian countries by ASMC.

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

There was no low-pressure line taking place in the lower part of the LMB on 27 September 2021, as shown in [Figure 1](#). Also, based on the Tropical Storm Risk (TSR), as displayed in [Figure 3](#), there was no sign of tropical depression moving to the Mekong region up to 27 September 2021.

#### Active system as of 27 September 2021 9:08 GMT

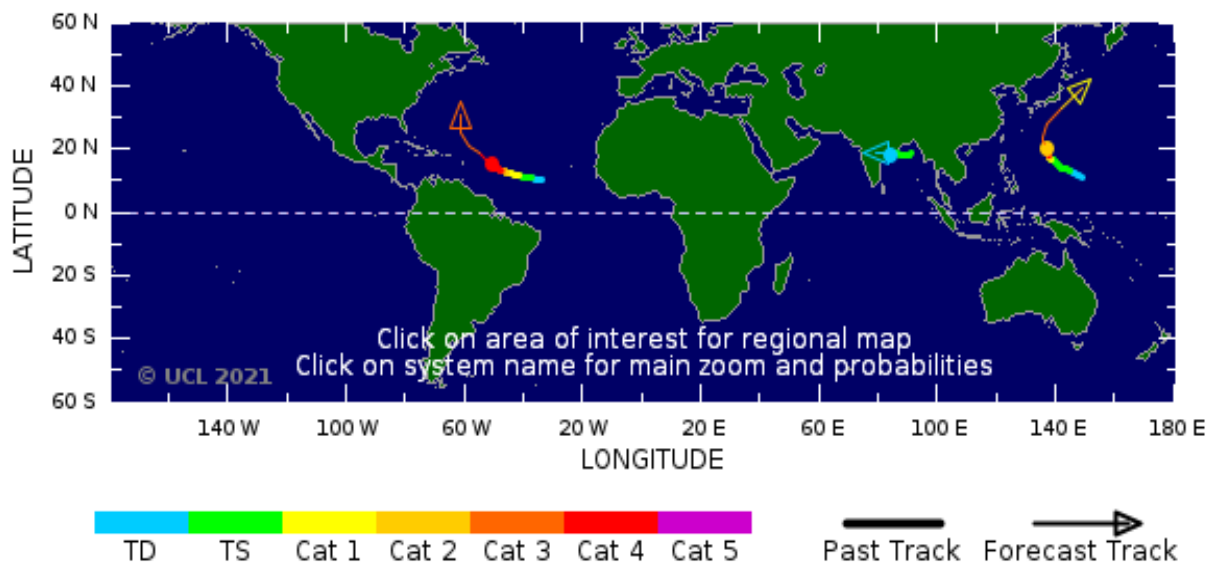
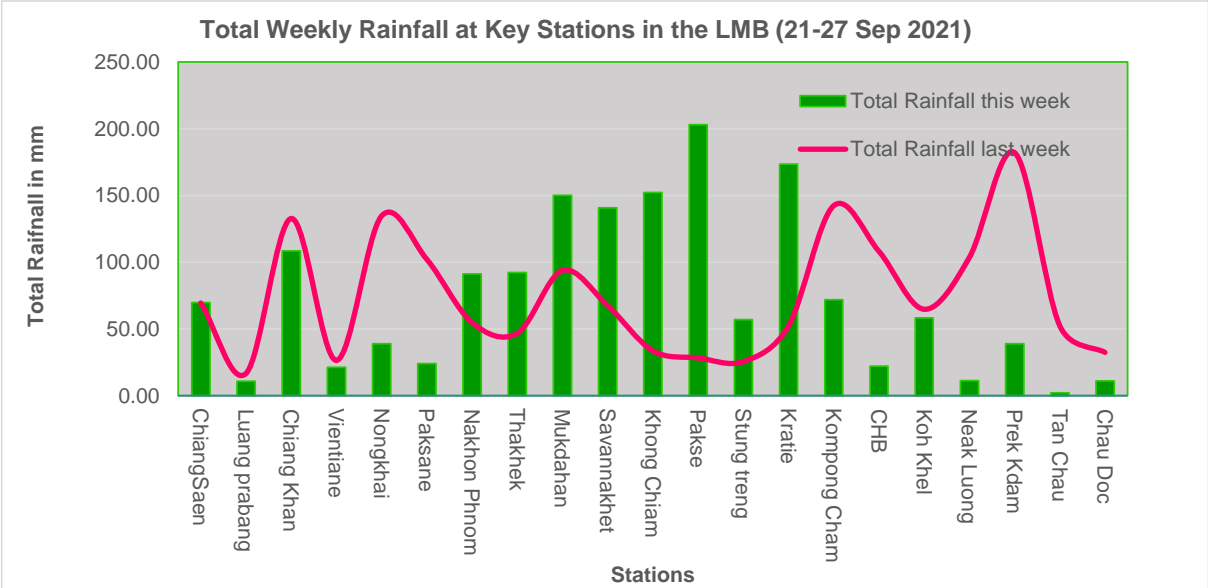


Figure 3. A tropical depression risk observed on 27 September 2021.

**2.2 Rainfall patterns over the LMB**

This week, rainfall focused in the areas from Chiang Saen in Thailand to Pakse in Lao PDR, including the lower part in Cambodia and Viet Nam, varying from 2.10 mm to 203.10 mm. The weekly total rainfall from 21 to 27 September 2021 in this reporting week was considered high at Prek Kdam in Cambodia. This week rainfall is lower than 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 14-20 September 2021.

To verify area rainfall distribution, [Figure 5](#) shows a map of the weekly accumulated rainfall based on observed data provided by the MRC MCs – Cambodia, Lao PDR, Thailand, and Viet Nam – from 21-27 September 2021.

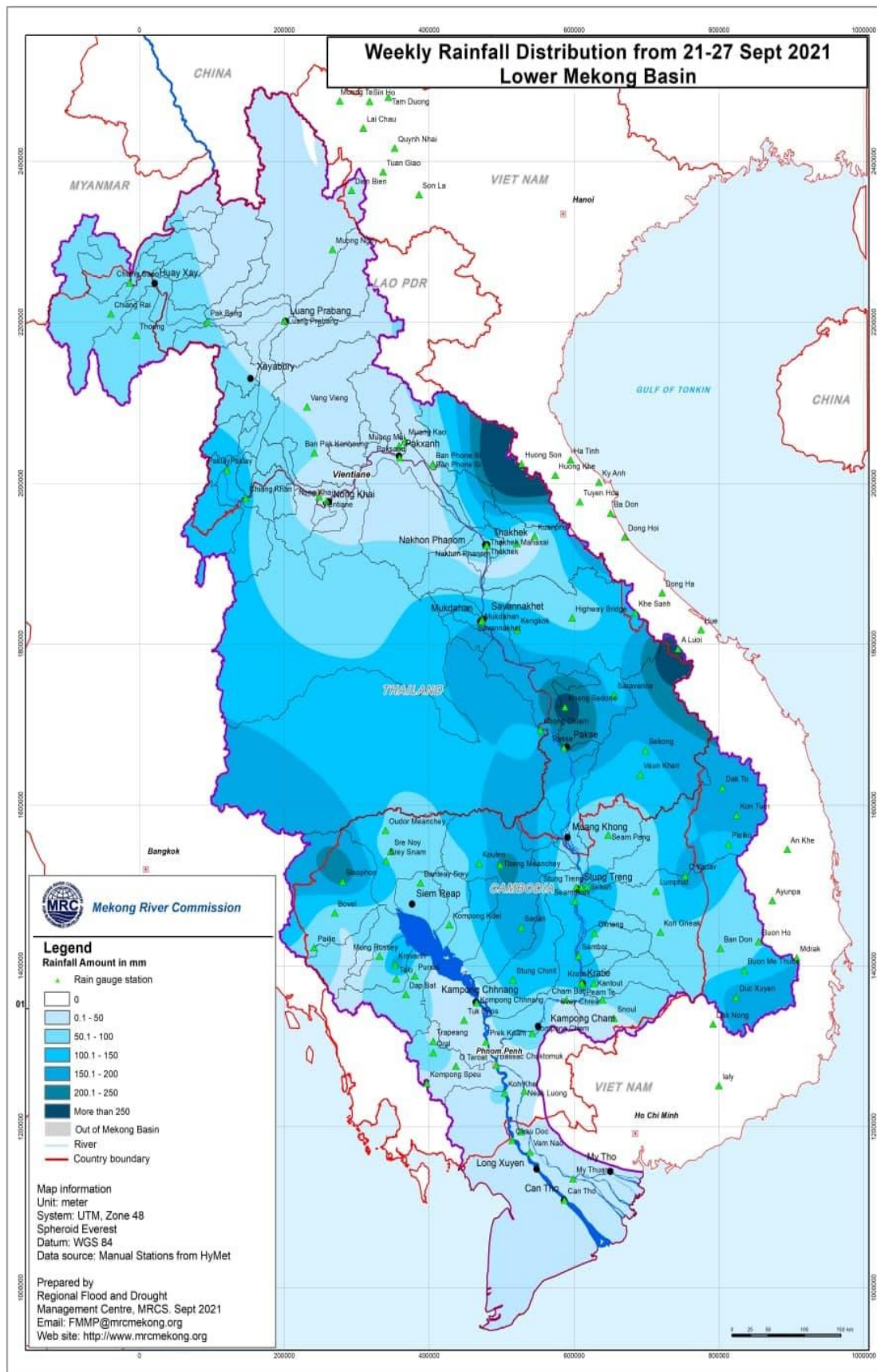
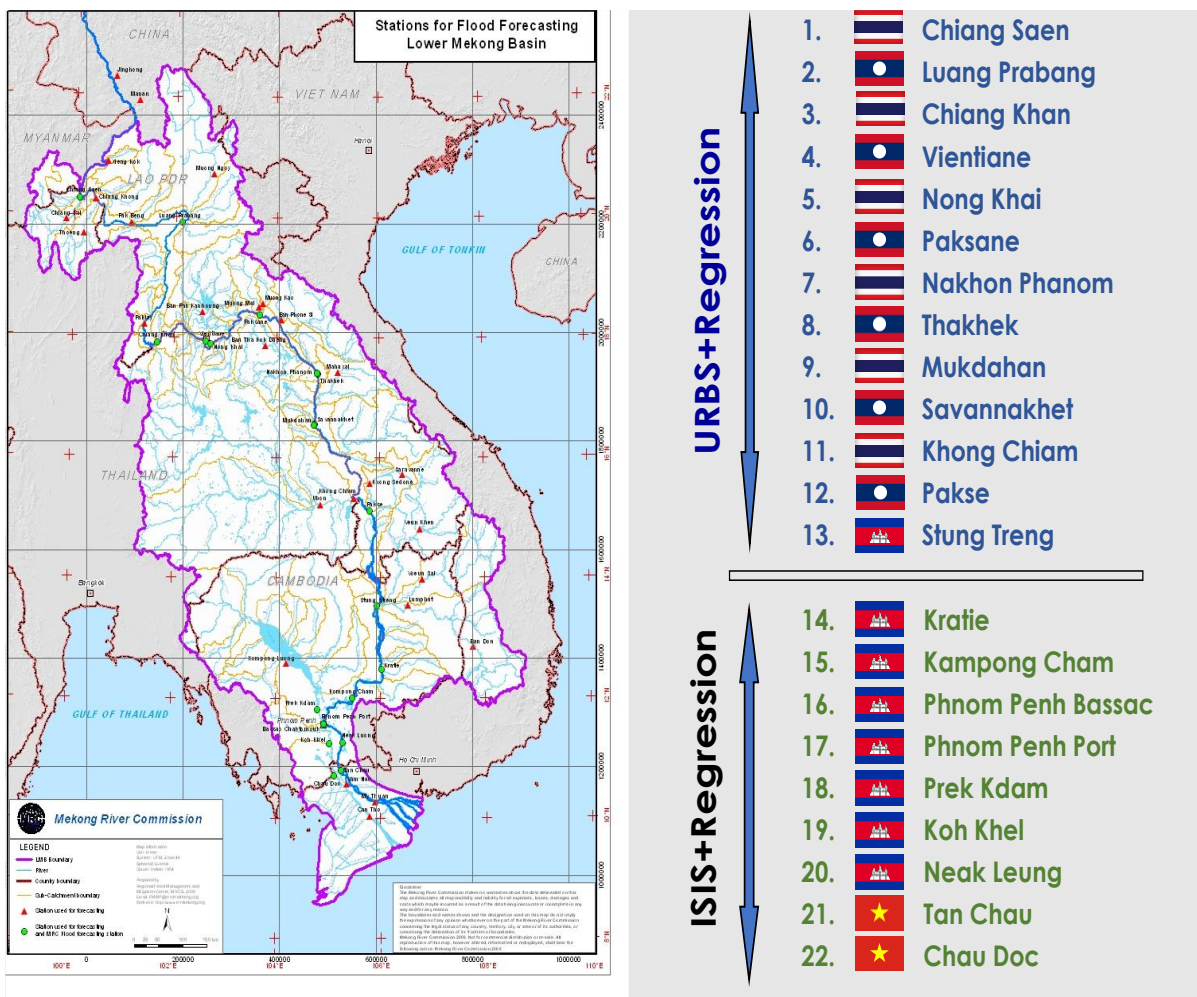


Figure 5. Weekly rainfall distribution over the LMB during 14-20 September 2021.

### 3 Water Levels in the Lower Mekong River

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

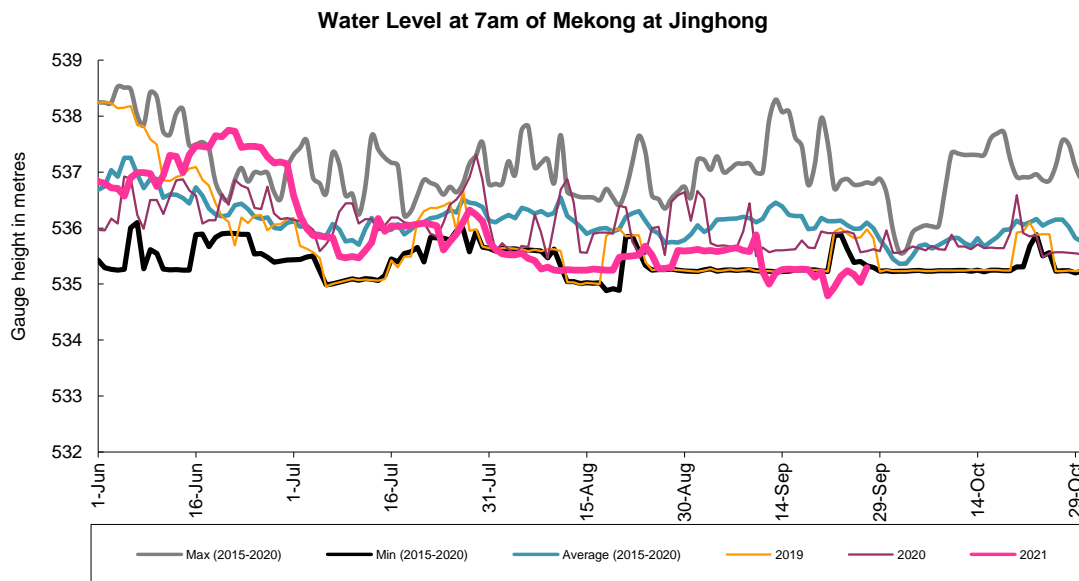
The key stations along the LMB and their respective model application for River Flood Forecasting during the wet season from June to October and River Monitoring during the dry season from November to May are presented in [Figure 6](#). The hydrograph for each key station is available from the MRC’s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



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

According to MRC’s observed water level data, the outflows at Jinghong hydrological station showed a significant decrease over the monitoring period from 10 to 27 September 2021. It dropped **about 0.83 m from 535.98 m on 10 Sept to 535.15 on 27 Sept 2021 (recorded on 7:00 am)**. The outflows decreased from 1,318 m<sup>3</sup>/s on Sept 10 to 761 m<sup>3</sup>/s on Sept 27, 2021. From September 21 to 27, water level at this station dropped 0.50 m and was about 0.04 m lower than its historical minimum value.

[Figure 7](#) below presents water level decreased at the Jinghong hydrological station<sup>1</sup>, indicating that the trend of decreased water level from 10 to 27 September 2021 and showed about 0.04 m lower than its minimum level.



**Figure 7.** Water level at the Jinghong hydrological station during 1 July-27 September 2021.

Along with the significant low outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen in Thailand also decreased about 0.25 m from 21 to 27 September 2021. However, from Chiang Khan in Thailand to Vientiane in Lao PDR, water levels increased about 0.55 m during 21-27 September due to some average rainfall in the area and dam operation. Water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR were slightly increasing. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia were significantly increasing, due to heavy rainfall in 3S areas and following the same trend of the upstream flow (at Pakse).

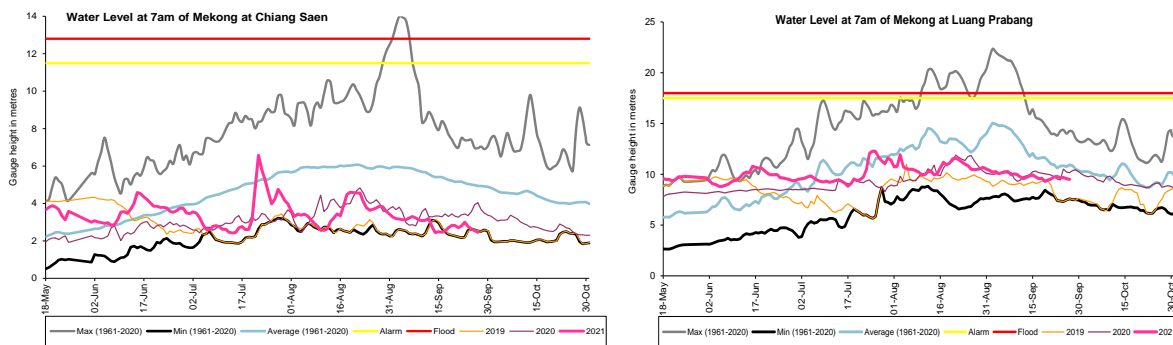
Based on hydrological phenomenon, the contribution of inflow water from the upstream of Lancang-Mekong in China to the Mekong mainstream is about 16% in total during the wet season from June to October. The whole inflow of water into the LMB is influenced by rainfall at the Mekong mainstream and its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

<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>.

### Chiang Saen and Luang Prabang

The water level from 21 to 27 September 2021 at Thailand’s Chiang Saen slightly decreased from 2.70 m to 2.45 m, showing 0.25 m down and was about 0.07 m lower than its minimum level, which considered very critical. The water level at Luang Prabang station in Lao PDR slightly decreased from 9.54 m to 9.50 m during the reporting period. This level shows 1.43 m lower than its long-term-average (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 7.45 m to 8.28 m during the reporting week. This significant increase showed 1.80 m lower than its Long-Term- Average (LTA). The water level downstream at Vientiane in Lao PDR followed the upstream trend. It also increased from 5.15 m to 5.70 m and was about 1.60 m lower than its LTA during 21-27 September. However, at Nong Khai station in Thailand, the water level also increased during the reporting period. It was up from 5.26 m to 5.67 m, showing 2.36 m lower than its LTA. For Paksane in Lao PDR, water levels decreased about 0.58 m, dropping from 6.79 m to 6.21 m. The WL at this station was still about 3.24 m lower than its LTA. The recent decreased water levels were obviously due to the low rainfall in the sub-catchment area, amid the inflows from upstream. The water levels at Vientiane and Paksane are shown in [Figure 9](#) below.

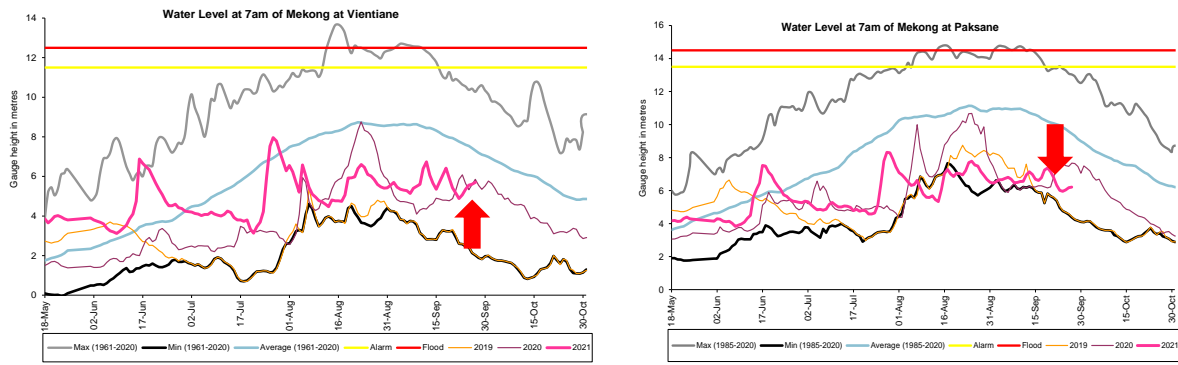


Figure 9. Water levels Veintiane and Paksane in Lao PDR.

### Nakhon Phanom to Pakse

The water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR significantly decreased about 0.55 m due to low rainfall and less inflow from upstream. Further downstream from Khong Chiam in Thailand to Pakse in Lao PDR increased between 0.54 m and 0.76 m due to heavy rainfall in the catchment area. **However, water levels at these stations (Nakhon Phanom to Pakse) were staying below their LTA level, which were still considered critical.** [Figure 10](#) shows the water levels at Nakhon Phanom and Pakse stations.

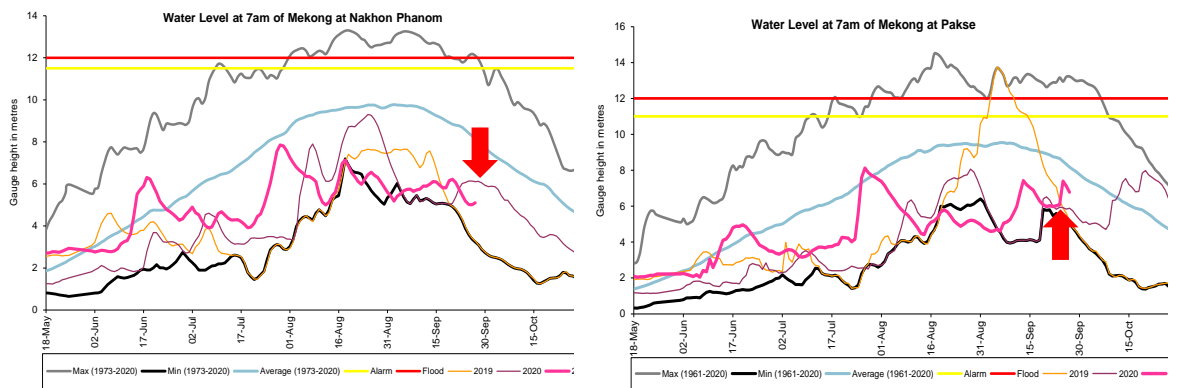
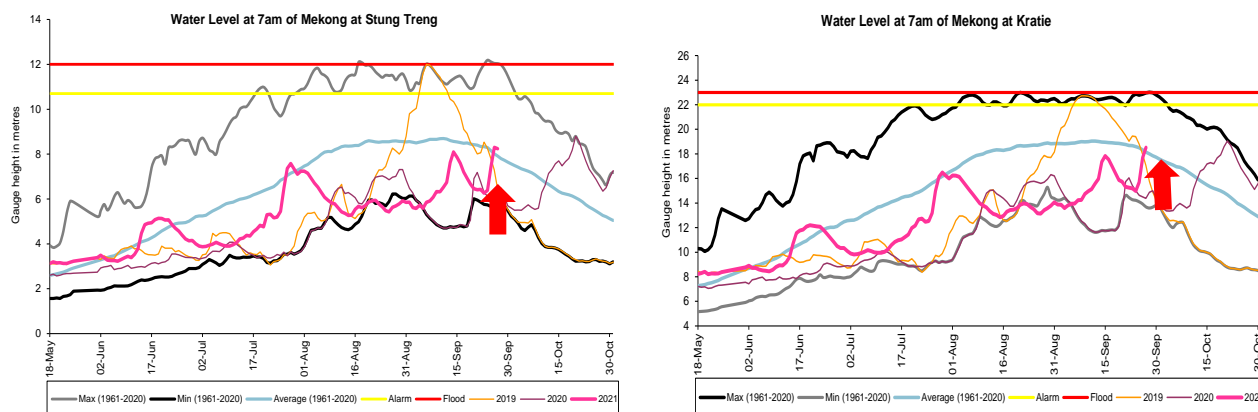


Figure 10. Weekly water levels at Nakhon Phanom in Thailand and Pakse in Lao PDR

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

Followed the same trend 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 significantly went up during 21-27 September 2021. This week water level at Stung Treng and Kratie increased about 1.63 m and 3.20 m, respectively, moving up to about 0.35 m higher than their LTA (as showed in [Figure 11](#)). Also, the water level at Kompong Cham remarkably increased about 2.11 m but was still about 1.17 m lower than its LTA. **Water levels at these stations were moving close to their TLA levels, which considered normal.**





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

At Chaktomuk on the Bassac River, due to local rainfall in the inflow catchment, the water level increased by about 0.90 m and stayed 2.38 m lower than its LTA value; while at Koh Khel, water level went up 0.63 m, staying **0.88** m lower than its LTA value. The water level at Prek Kdam on the Tonle Sap Lake increased about 0.89 m and was about 2.27 m lower than its LTA 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 locally heavy rainfall contributed from upstream of the Tonle Sap Lake area during the reporting period. The water level at the Tonle Sap Lake (observed at Kompong Luong) followed the same trend of Prek Kdam station's water level. **Water levels at these stations were staying lower than their LTA levels, which still considered critical.**

### Tidal stations at Tan Chau and Chau Doc

Like last week, the water levels from 21 to 27 September 2021 at Viet Nam's Tan Chau and Chau Doc were fluctuating due to daily tidal effects from the sea. The fluctuation levels were between 1.90 m and 1.94 m; they were in between 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 September 27 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 conditions. 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.

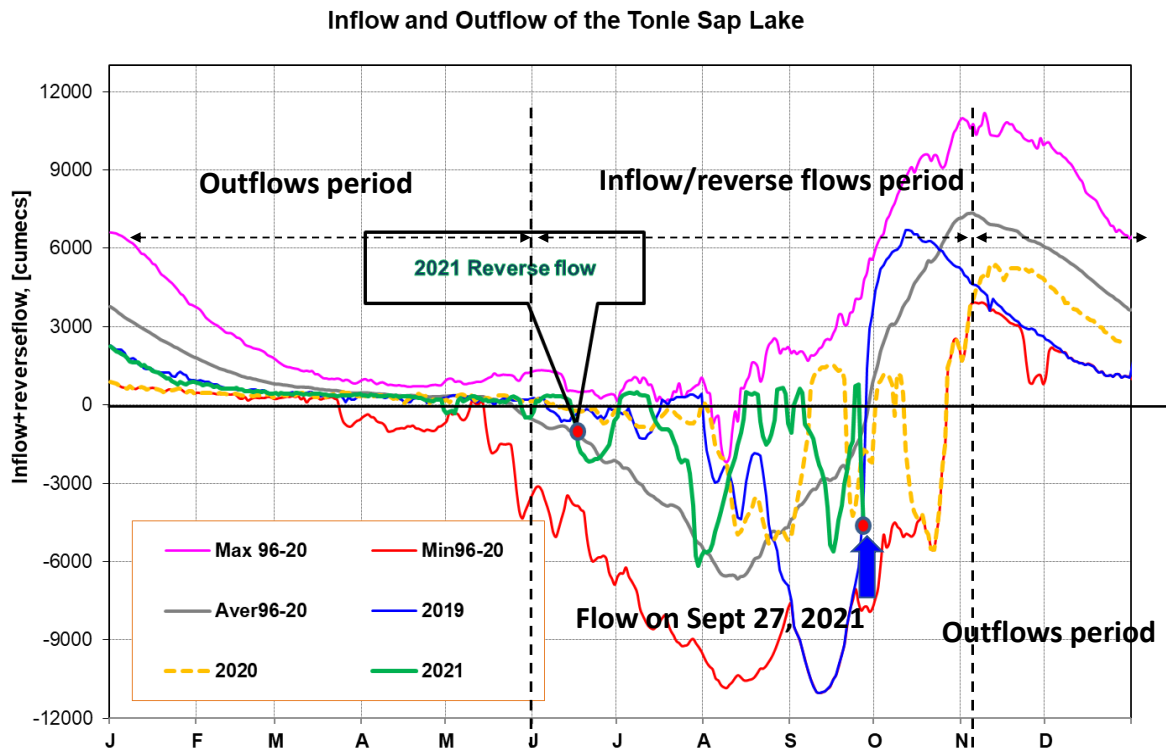


Figure 12. Seasonal change of inflows and outflows of Tonle Sap Lake

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 September 27 for the Lake compared with the volumes in 2018, 2019 and 2020, their LTA, and the fluctuation levels (1997–2019). It shows that up to September 27, **the water volume of the Tonle Sap Lake is lower than its LTA but 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.

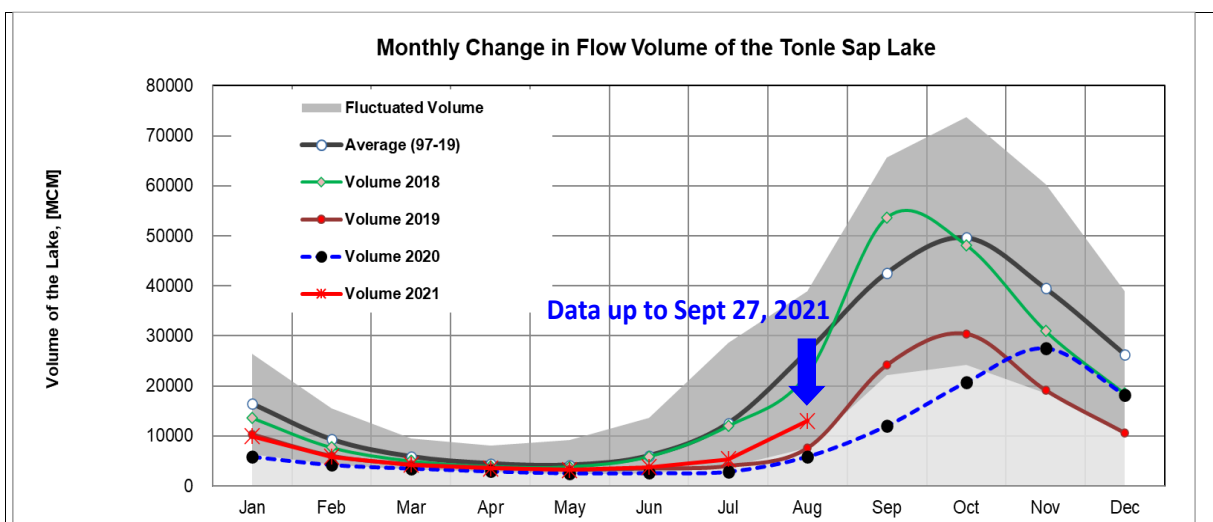


Figure 13. The seasonal change in monthly flow volume of Tonle Sap Lake.

**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	12998.49
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.

## 4 Flash Flood in the Lower Mekong Basin

From September 21 to 27, the LMB was affected by three weather factors including (i) The active low-pressure cell in the middle east sea intensified into a tropical depression and tropical storm “Dianmu” covering the coast of middle Viet Nam on Sep 23 making landfall over Quang Nam province, Viet Nam in the morning of 24 Sep. It weakened into the tropical depression at Savannakhet, Lao PDR and moved to cover Mukdahan province of Thailand in the evening of the same day; (ii) the monsoon trough lay across the central, eastern and lower north-eastern parts of Thailand during early and mid-week then it lay towards the low-pressure cell over Cambodia on Sep 20; and (iii) the southwest monsoon prevailed over the Gulf of Thailand throughout the week. These conditions caused moderate and heavy rainfall from the middle to the lower parts of the LMB (including parts of Thailand, Lao PDR, Cambodia, and Viet Nam) mainly during early and late 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, ranging from low risk 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 September 24.

Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Thailand												
Date of FFG products 24/09/2021 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	Region	Level Risk	Provinces	Districts	Region	Level Risk	Provinces	Districts	Region	Level Risk	
Ubon Ratchathani	Nam Yun	Northeastern	Low-Risk	Ubon Ratchathani	Buntharik	Northeastern	Low-Risk	Ubon Ratchathani	Nam Yun	Northeastern	Low-Risk	
Ubon Ratchathani	Buntharik	Northeastern	Low-Risk	Roi Et	Muaiwadi	Northeastern	Low-Risk	Ubon Ratchathani	Buntharik	Northeastern	Low-Risk	
Khon Kaen	Ban Phai	Northeastern	Low-Risk	Nakhon Sawan	Ta Khli	Central	Low-Risk	Ubon Ratchathani	Lao Sua Kok	Northeastern	Low-Risk	
Roi Et	Muaiwadi	Northeastern	Low-Risk	Uthai Thani	Lan Sak	Central	Low-Risk	Chaiyaphum	Nong Bua Daeng	Northeastern	Low-Risk	
Roi Et	Suwan Phum	Northeastern	Low-Risk	Nakhon Sawan	Layao	Central	Low-Risk	Chaiyaphum	Nong Bua Daeng	Northeastern	Low-Risk	
Roi Et	Suwan Phum	Northeastern	Low-Risk	Kampaeng Phet	Khlong Lan	Northern	Low-Risk	Khon Kaen	Ban Phai	Northeastern	Low-Risk	
Surin	Sri Narong	Northeastern	Low-Risk	Sukhothai	Khui Mat	Northern	Low-Risk	Roi Et	Muaiwadi	Northeastern	Low-Risk	
Bangkok	Bangkok	Central	Low-Risk	Phra Nakhon Si Ay Bang Pa-in			Low-Risk	Roi Et	Suwan Phum	Northeastern	Low-Risk	
Samut Sakhon	Muang Samut Sakhon	Northeastern	Low-Risk	Phra Nakhon Si Ay Bang Pa-in			Low-Risk	Roi Et	Suwan Phum	Northeastern	Low-Risk	
Samut Prakarn	Phra Samut Chedi		Low-Risk	Uthai Thani	Huai Kot	Central	Low-Risk	Nakhon Ratchasim	Pakthongchai	Northeastern	Low-Risk	
Chachoengsao	Bang Nam Pieo	Eastern	Low-Risk	Phra Nakhon Si Ay Sena			Low-Risk	Buriram	Nongki	Northeastern	Low-Risk	
Bangkok	Bangkok	Central	Low-Risk	Uthai Thani	Huai Kot	Central	Low-Risk	Buriram	Ban Dan	Northeastern	Low-Risk	
Chachoengsao	Bang Nam Pieo	Eastern	Low-Risk	Kanchanaburi	Si Sawat	Central	Low-Risk	Buriram	Huai Rat	Northeastern	Low-Risk	
Nakhon Sawan	Ta Khli	Central	Low-Risk					Surin	Sri Narong	Northeastern	Low-Risk	
Uthai Thani	Lan Sak	Central	Low-Risk					Ubon Ratchathani	Sirinthon	Northeastern	Low-Risk	
Nakhon Sawan	Layao	Central	Low-Risk					Surin	Prasat	Northeastern	Low-Risk	
Kampaeng Phet	Khlong Lan	Northern	Low-Risk					Tak	Mae Sot	Northern	Low-Risk	
Sukhothai	Ban Dan Lan Hoi	Northern	Low-Risk					Bangkok	Bangkok	Central	Low-Risk	
Tak	Muang Tak	Northern	Low-Risk					Samut Sakhon	Muang Samut Sakhon	Northeastern	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 24/09/2021 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
Savannakhet	Sepone	SALOUNG	Southern	Low-Risk	Saravane	Ta oi	PHOR SANH	South	Low-Risk	Savannakhet	Sepone	SALOUNG	Southern	Low-Risk
Saravane	Ta oi	PHOR SANH	South	Low-Risk	Bolikhmaysay	Khamkheut	NAPHOUANG	Central Laos	Low-Risk	Saravane	Ta oi	TUMLEKHAO	South	Low-Risk
Bolikhmaysay	Khamkheut	PHAPOUN	Central Laos	Low-Risk	Sekong	Kaleum	PRO	Southeast	Low-Risk	Saravane	Ta oi	PHOR SANH	South	Low-Risk
Khammuane	Nakai	PUU	Center of Laos	Low-Risk	Sekong	Kaleum	KA-OUANG	Southeast	Low-Risk	Bolikhmaysay	Khamkheut	PHAPOUN	Central Laos	Low-Risk
Bolikhmaysay	Khamkheut	PAUNGLAN	Central Laos	Low-Risk	Sekong	Kaleum	AR-PEUANG	Southeast	Low-Risk	Bolikhmaysay	Khamkheut	PHONESI	Central Laos	Low-Risk
Bolikhmaysay	Khamkheut	NAPHOUANG	Central Laos	Low-Risk	Sekong	Kaleum	STHORN	Southeast	Low-Risk	Khammuane	Nakai	PUU	Center of Laos	Low-Risk
Khammuane	Bualapha	SENE PHANH	Center of Laos	Low-Risk	Sekong	Lamarm	KANONG MAI	Southeast	Moderate-Risk	Bolikhmaysay	Khamkheut	PAUNGLAN	Central Laos	Low-Risk
Khammuane	Bualapha	VANG KHON	Center of Laos	Low-Risk	Sekong	Lamarm	TAVI	Southeast	Low-Risk	Bolikhmaysay	Khamkheut	NAPHOUANG	Central Laos	Low-Risk
Sekong	Kaleum	PRO	Southeast	Low-Risk	Sekong	Lamarm	KADONE	Southeast	Low-Risk	Bolikhmaysay	Khamkheut	PAKHA	Central Laos	Low-Risk
Sekong	Kaleum	AR-HOR NEUA	Southeast	Low-Risk	Sekong	Dakcheung	DAKYUENG	Southeast	Low-Risk	Khammuane	Hinboon	MOUANG NAM SANG	Center of Laos	Low-Risk
Sekong	Kaleum	KA-OUANG	Southeast	Low-Risk	Sekong	Dakcheung	DAKDEN	Southeast	Low-Risk	Khammuane	Bualapha	SENE PHANH	Center of Laos	Low-Risk
Sekong	Kaleum	PANORM	Southeast	Low-Risk	Sekong	Dakcheung	DAKVANG	Southeast	Moderate-Risk	Khammuane	Bualapha	VANG KHON	Center of Laos	Low-Risk
Sekong	Kaleum	AR-PEUANG	Southeast	Low-Risk	Sekong	Dakcheung	DAKXAM	Southeast	Low-Risk	Saravane	Saravane	MAKNAONHAI	South	Low-Risk
Sekong	Kaleum	STHORN	Southeast	Moderate-Risk						Champasak	Pathoomph	NAMPHAAK	Southwestern	Low-Risk
Sekong	Lamarm	KANONG MAI	Southeast	High-Risk						Champasak	Paksong	THONGYAO	Southwestern	Low-Risk
Sekong	Lamarm	TAVI	Southeast	Low-Risk						Sekong	Kaleum	PRO	Southeast	Low-Risk
Sekong	Lamarm	KADONE	Southeast	Low-Risk						Sekong	Kaleum	AR-HOR NEUA	Southeast	Low-Risk
Sekong	Dakcheung	DAKYUENG	Southeast	Low-Risk						Sekong	Kaleum	KA-OUANG	Southeast	Low-Risk
Sekong	Dakcheung	DAKDEN	Southeast	Moderate-Risk						Sekong	Kaleum	PANORM	Southeast	Low-Risk
Sekong	Dakcheung	DAKKE	Southeast	Low-Risk						Sekong	Kaleum	AR-PEUANG	Southeast	Low-Risk

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

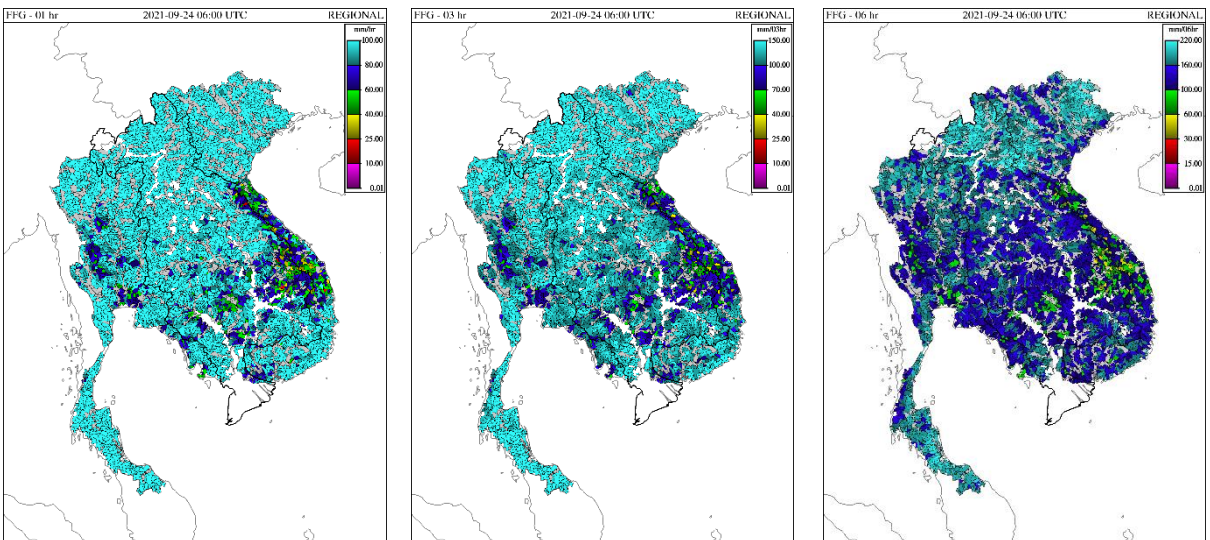
Date of FFG products 24/09/2021 06:00 UTC time

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
Ratana Kiri	Ta Veang	Phlueu Thum	Northeast	Low-Risk	Ratana Kiri	Ou Chum	Tun	Northeast	Low-Risk	Stung Treng	Siem Pang	Kham Phouk	Northeast	Low-Risk
Ratana Kiri	Ta Veang	Ta Veang	Northeast	Low-Risk	Preah Vihear	Sangkom Thmei	Rumlum Slaeng	North	Low-Risk	Ratana Kiri	Ta Veang	Phlueu Thum	Northeast	Low-Risk
Ratana Kiri	Ou Chum	Tun	Northeast	Low-Risk	Preah Vihear	Sangkom Thmei	koukThkov	North	Low-Risk	Ratana Kiri	Ta Veang	Ta Veang	Northeast	Low-Risk
Ratana Kiri	Veun Sai	Tiem Kraom	Northeast	Low-Risk	Preah Vihear	Sangkom Thmei	Sdau	North	Low-Risk	Ratana Kiri	Ou Chum	Tun	Northeast	Low-Risk
Ratana Kiri	Koun Mom	Ko Hoksab	Northeast	Low-Risk	Kampong Chhnang	Kampong Leang	Kandal	Central	Low-Risk	Ratana Kiri	Veun Sai	Tiem Kraom	Northeast	Low-Risk
Ordar Meancheay	Banteay Ampil	Pou Chas	North	Low-Risk	Kampong Cham	Stueng Trang	Veal Preah	Central Lowland	Low-Risk	Ratana Kiri	Koun Mom	Ko Hoksab	Northeast	Low-Risk
Battambang	Battambang	Tumpung Cheung	Northwest	Low-Risk	Preah Vihear	Choom Khsant	Tmat Paey	North	Low-Risk	Ordar Meancheay	Banteay Ampil	Pou Chas	North	Low-Risk
Battambang	Aek Phnum	Kouk Doung	Northwest	Low-Risk	Preah Vihear	Choom Khsant	Krala Peas	North	Low-Risk	Battambang	Battambang	Tumpung Cheung	Northwest	Low-Risk
Battambang	Sanglae	Ta Kok	Northwest	Low-Risk	Preah Vihear	Sangkom Thmei	Kbal Khla	North	Low-Risk	Battambang	Aek Phnum	Kouk Doung	Northwest	Low-Risk
Siem Reap	Puok	Prey Veang	Northwest	Low-Risk	Kampong Thom	Baray	Pongu Ling	Northwest	Low-Risk	Battambang	Sanglae	Ta Kok	Northwest	Low-Risk
Battambang	Moung Ruessei	Koun Khlong	Northwest	Low-Risk	Siهانوك Ville	Prey Nob	Chumpu Khmau	Southwest	Low-Risk	Siem Reap	Puok	Prey Veang	Northwest	Low-Risk
Siem Reap	Chi Kraeng	Roveng	Northwest	Low-Risk						Battambang	Moung Ruessei	Koun Khlong	Northwest	Low-Risk
Siem Reap	Svay Leu	Bet Phka	Northwest	Low-Risk							Sambour	Koun Va	Northeast	Low-Risk
Siem Reap	Chi Kraeng	Krang	Northwest	Low-Risk						Siem Reap	Chi Kraeng	Roveng	Northwest	Low-Risk
Preah Vihear	Sangkom Thmei	Rumlum Slaeng	North	Low-Risk						Siem Reap	Svay Leu	Bet Phka	Northwest	Low-Risk
Preah Vihear	Sangkom Thmei	koukThkov	North	Low-Risk						Siem Reap	Chi Kraeng	Krang	Northwest	Low-Risk
Preah Vihear	Sangkom Thmei	Sdau	North	Low-Risk						Preah Vihear	Sangkom Thmei	Rumlum Slaeng	North	Low-Risk
Kampong Chhnang	Kampong Leang	Kandal	Central	Low-Risk						Preah Vihear	Sangkom Thmei	koukThkov	North	Low-Risk
Kampong Cham	Stueng Trang	Veal Preah	Central Lowland	Low-Risk						Preah Vihear	Sangkom Thmei	Sdau	North	Low-Risk
Kampong Cham	Stueng Trang	Sampiang Kraom	Central Lowland	Low-Risk						Preah Vihear	Roveng	Svay Damrak Thmei	North	Low-Risk
Preah Vihear	Chhaeb	Phaeus Kak	North	Low-Risk						Preah Vihear	Veal Veang	Chanika Chey Khang Thong	Western	Low-Risk
Preah Vihear	Chhaeb	Chouk Chey	North	Low-Risk						Pursat	Veal Veang	Cheuteal Chrum	Western	Low-Risk
Preah Vihear	Choom Khsant	Tmat Paey	North	Low-Risk						Kampong Chhnang	Kampong Leang	Kandal	Central	Low-Risk
Preah Vihear	Choom Khsant	Krala Peas	North	Low-Risk						Kampong Cham	Stueng Trang	Veal Preah	Central Lowland	Low-Risk
Preah Vihear	Kuleasen	Kaoh Ker	North	Low-Risk						Kampong Cham	Stueng Trang	Sampiang Kraom	Central Lowland	Low-Risk
Preah Vihear	Sangkom Thmei	Kbal Khla	North	Low-Risk						Preah Vihear	Chhaeb	Phaeus Kak	North	Low-Risk
Preah Vihear	Tbaeng Mean Chey	Krang Doung	North	Low-Risk						Preah Vihear	Chhaeb	Chouk Chey	North	Low-Risk
Preah Vihear	Roveng	Oloek	North	Low-Risk						Preah Vihear	Choom Khsant	Tmat Paey	North	Low-Risk
Preah Vihear	Chey Saen	Peul	North	Low-Risk						Preah Vihear	Choom Khsant	Krala Peas	North	Low-Risk
Preah Vihear	Chhaeb	Tuol Roveng	North	Low-Risk						Preah Vihear	Choom Khsant	Kaeng Yaeng	North	Low-Risk
Kampong Thom	Sandan	Srae Pring	Northwest	Low-Risk						Preah Vihear	Kuleasen	Kaoh Ker	North	Low-Risk
Kampong Thom	Baray	Kokor Thum	Northwest	Low-Risk						Preah Vihear	Sangkom Thmei	Kbal Khla	North	Low-Risk
Kampong Thom	Baray	Pongu Ling	Northwest	Low-Risk						Preah Vihear	Tbaeng Mean Chey	Krang Doung	North	Low-Risk
Shanouk Ville	Prey Nob	Veal Thum	Southwest	Low-Risk						Preah Vihear	Roveng	Oloek	North	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 24/09/2021 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
Kon Tum	Sa Thay	Central Highlands	Moderate-Risk	Kon Tum	Sa Thay	Central Highlands	Moderate-Risk	Kon Tum	Sa Thay	Central Highlands	Moderate-Risk
Gia Lai	la Grai	Central Highlands	Low-Risk	Gia Lai	la Grai	Central Highlands	Low-Risk	Gia Lai	la Grai	Central Highlands	Low-Risk
Kon Tum	Sa Thay	Central Highlands	Low-Risk	Gia Lai	Duc Co	Central Highlands	Low-Risk	Gia Lai	Duc Co	Central Highlands	Low-Risk
Gia Lai	Duc Co	Central Highlands	Low-Risk	Gia Lai	Chu Se	Central Highlands	Low-Risk	Gia Lai	Chu Prong	Central Highlands	Low-Risk
Gia Lai	Chu Prong	Central Highlands	Low-Risk	Quang Tri	Huong Hoa	North Central	Low-Risk	Nghé An	Thanh Chung	North Central	Low-Risk
Quang Tri	Huong Hoa	North Central	Low-Risk	Quang Nam	Hien	South Central Coast	Low-Risk	Ha Tinh	Huong Khe	North Central	Low-Risk
Quang Binh	Minh Hoa	North Central	High-Risk	Ha Tinh	Huong Son	North Central	Low-Risk	Quang Binh	Minh Hoa	North Central	Moderate-Risk
Quang Nam	Hien	South Central Coast	Moderate-Risk	Kon Tum	Dak Glei	Central Highlands	Low-Risk	Ha Tinh	Huong Son	North Central	Moderate-Risk
Quang Nam	Nam Giang	South Central Coast	Moderate-Risk	Kon Tum	Ngoc Hoi	Central Highlands	Low-Risk	Quang Nam	Hien	South Central Coast	Moderate-Risk
Thua Thien Hue	A Luoi	North Central	Low-Risk	Quang Binh	Bo Trach	North Central	Low-Risk	Quang Nam	Nam Giang	South Central Coast	Moderate-Risk
Kon Tum	Dak Glei	Central Highlands	Moderate-Risk	Quang Binh	Quang Ninh	North Central	Moderate-Risk	Quang Tri	Huong Hoa	North Central	Low-Risk
Kon Tum	Ngoc Hoi	Central Highlands	Low-Risk	Quang Binh	Le Thuy	North Central	Low-Risk	Quang Ngai	Tra Bong	South Central Coast	Moderate-Risk
Kon Tum	Dak Glei	Central Highlands	Low-Risk	Quang Tri	Da Krong	North Central	Moderate-Risk	Quang Nam	Phuoc Son	South Central Coast	Low-Risk
Quang Binh	Bo Trach	North Central	Low-Risk	Thua Thien Hue	Phong Dien	North Central	Low-Risk	Quang Nam	Tra My	South Central Coast	Moderate-Risk
Quang Binh	Quang Ninh	North Central	Moderate-Risk	Thua Thien Hue	A Luoi	North Central	Low-Risk	Quang Nam	Que Son	South Central Coast	Low-Risk
Quang Binh	Le Thuy	North Central	Low-Risk	Quang Nam	Nam Giang	South Central Coast	Moderate-Risk	Kon Tum	Ngoc Hoi	Central Highlands	Low-Risk
Quang Tri	Da Krong	North Central	Moderate-Risk	Quang Nam	Phuoc Son	South Central Coast	Low-Risk	Quang Binh	Quang Ninh	North Central	Moderate-Risk
Thua Thien Hue	Phong Dien	North Central	Low-Risk	Kon Tum	Dak To	Central Highlands	Moderate-Risk	Kon Tum	Dak Glei	Central Highlands	Moderate-Risk
Thua Thien Hue	A Luoi	North Central	Low-Risk	Quang Nam	Tra My	South Central Coast	Low-Risk	Quang Nam	Dai Loc	South Central Coast	Low-Risk
Thua Thien Hue	Nam Dong	North Central	Low-Risk	Quang Nam	Que Son	South Central Coast	Low-Risk	Kon Tum	Dak To	Central Highlands	Moderate-Risk
Kon Tum	Dak Glei	Central Highlands	Low-Risk	Quang Ngai	Son Tay	South Central Coast	Low-Risk	Quang Tri	Da Krong	North Central	Moderate-Risk
Kon Tum	Dak To	Central Highlands	Moderate-Risk	Quang Ngai	Tra Bong	South Central Coast	Moderate-Risk	Thua Thien Hue	Phong Dien	North Central	Low-Risk
Kon Tum	Dak Glei	Central Highlands	Moderate-Risk	Quang Ngai	Ba To	South Central Coast	Low-Risk	Thua Thien Hue	A Luoi	North Central	Moderate-Risk
Quang Nam	Phuoc Son	South Central Coast	Low-Risk	Quang Ngai	Minh Long	South Central Coast	Low-Risk	Thua Thien Hue	Nam Dong	North Central	Low-Risk
Kon Tum	Kon Plong	Central Highlands	Low-Risk	Quang Ngai	Duc Pho	South Central Coast	Low-Risk	Quang Ngai	Son Ha	South Central Coast	Low-Risk
Kon Tum	Dak To	Central Highlands	Moderate-Risk	Binh Dinh	Hoai An	South Central Coast	Low-Risk	Quang Ngai	Minh Long	South Central Coast	Low-Risk



**Figure 14.** Flash Flood Guidance for the next 1 hour, 3 hours and 6 hours on Sep 24.

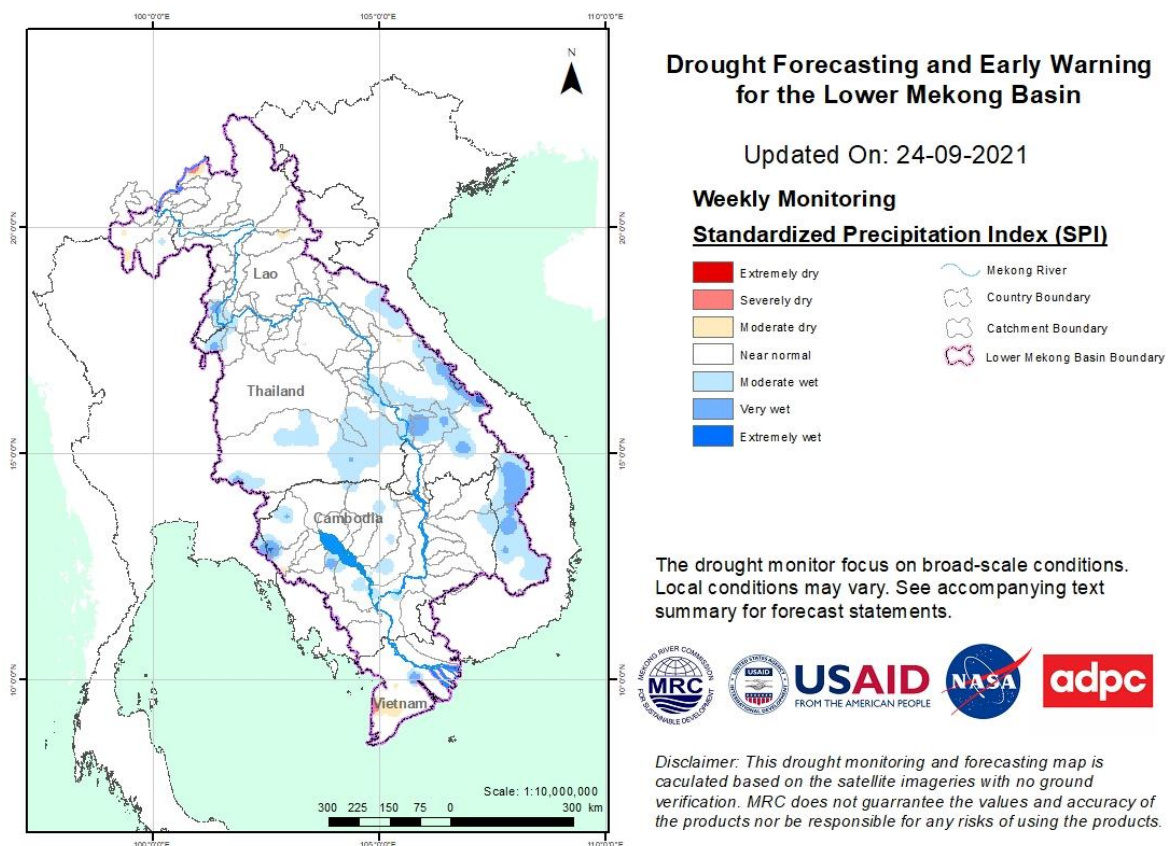
## 5 Drought Monitoring in the Lower Mekong Basin

### Weekly drought monitoring from 18 to 24 September 2021

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

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

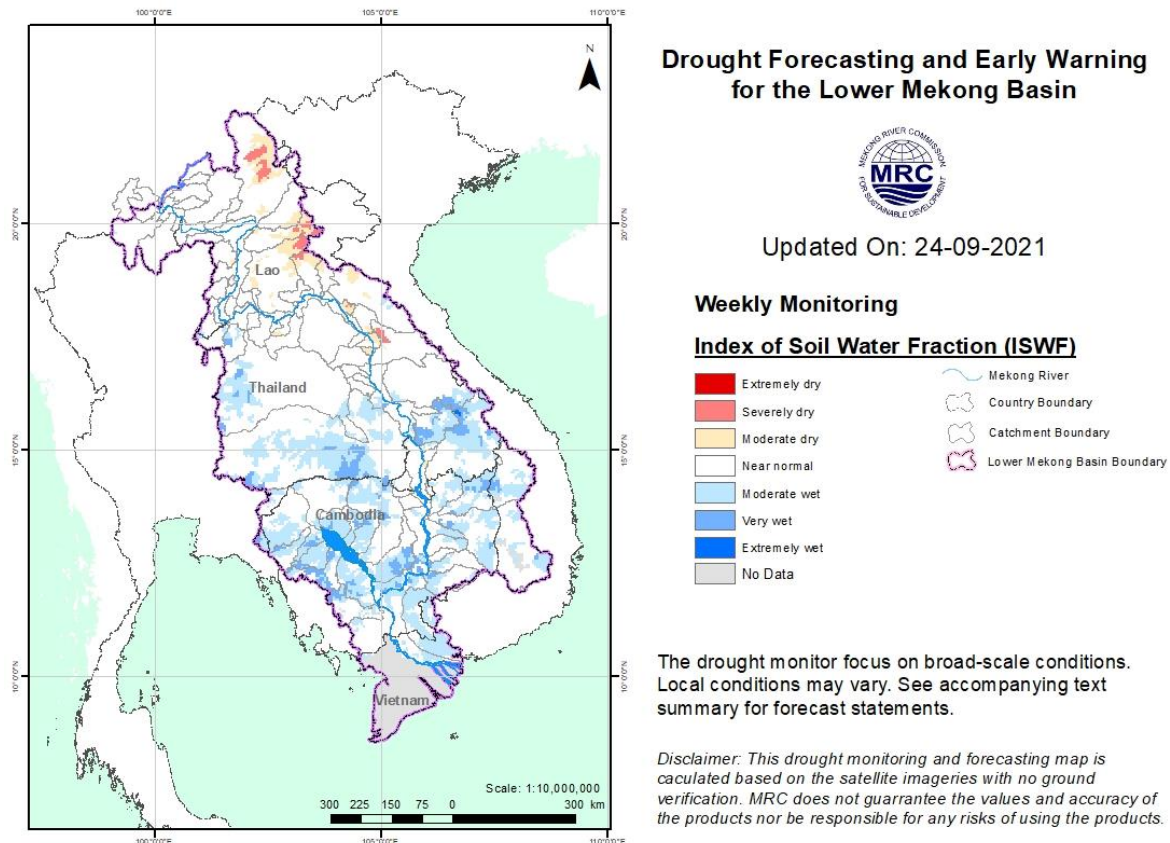
Meteorological drought indicator of SPI from September 18 to 24, as shown in [Figure 15](#), shows that the entire LMB was either normal or wet; the region received from average to above average rainfall during the monitoring week.



**Figure 15.** Weekly standardized precipitation index from 18 to 24 September 2021.

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

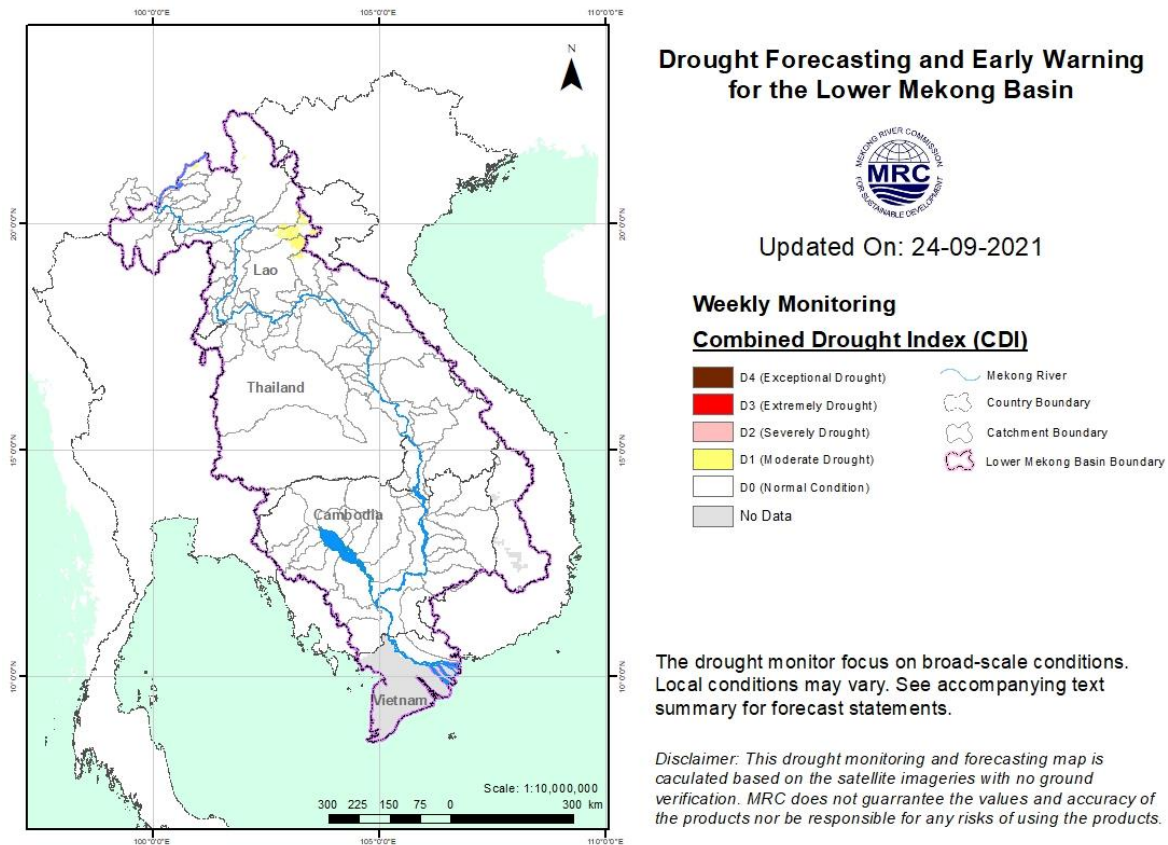
Like last week (Sep 11 to 17), the soil water fraction from September 18 to 24, as displayed in [Figure 16](#), shows wet condition in the lower half and normal to a slightly dry conditions in the upper half of the LMB. The little hot spot covered some area of Phongsaly and Xiengkhuang provinces of Lao PDR. The condition, however, was not significant.



**Figure 16.** Weekly Soil Moisture Anomaly from 18 to 24 September 2021.

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

With majority of normal and wet conditions of both meteorological and agricultural indicators, as shown in [Figure 17](#), the LMB shows no drought threat over the entire region during 18-24 September, through the combined drought index.



**Figure 17.** Weekly Combined Drought Index from 18 to 24 September 2021.

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



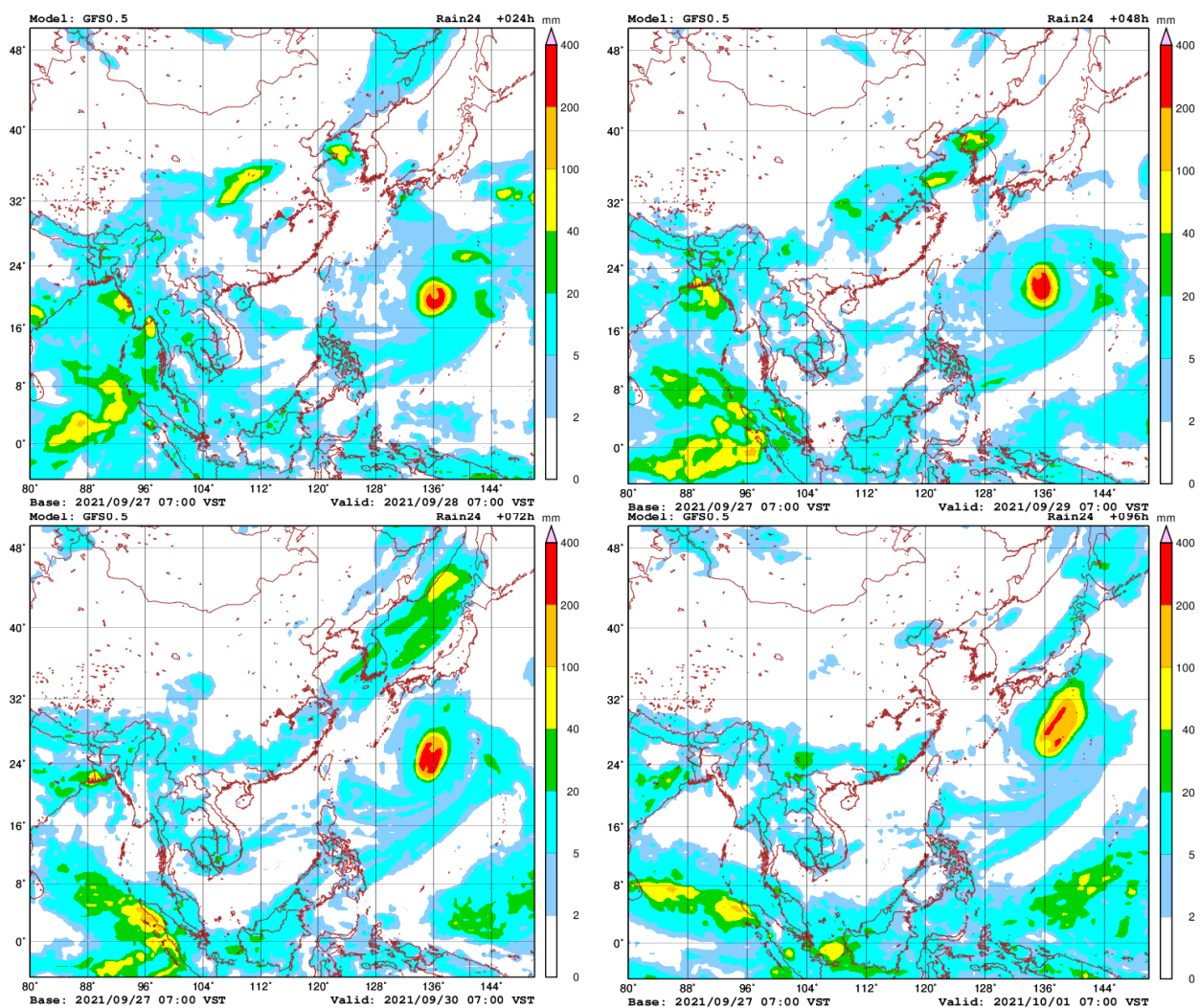
## 6 Weather and Water Level Forecast and Flash Flood Information

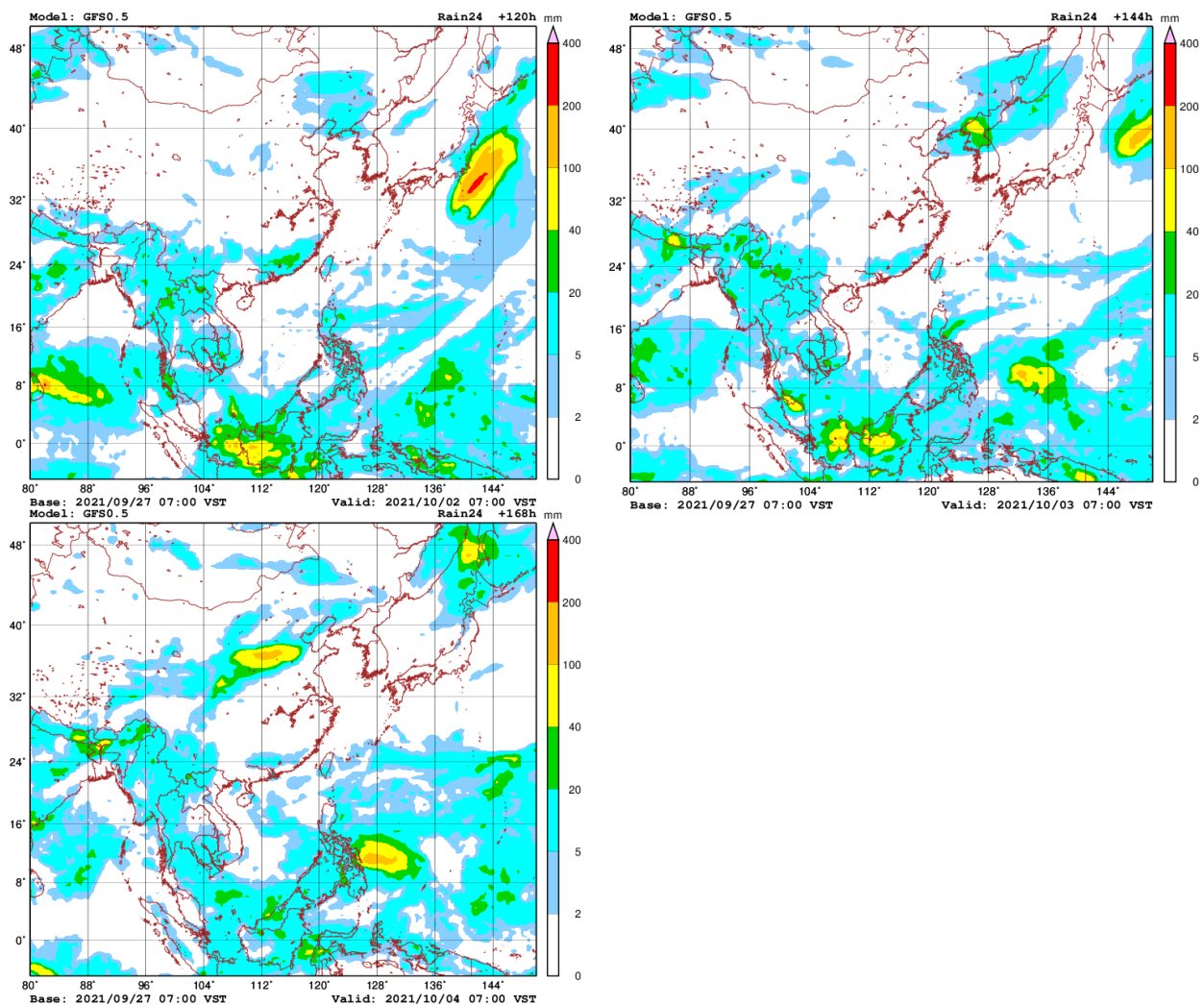
### 6.1 Weather and rainfall forecast

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

From September 28 to October 4, small rainfall (5 -20 mm/24h) will likely occur from over the LMB.

[Figure 18](#) shows accumulated rainfall forecast (24 h) of the GFS model from September 28 to October 4.





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

## 6.2 Water level forecast

### Chiang Saen and Luang Prabang

Based on September 27's daily flood forecasting bulletin, the daily forecasted water level at Chiang Saen in Thailand is expected to decrease from 2.45 m to 2.30 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 slightly increase from 9.50 m to 9.52 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 0.35 m, while water level at Vientiane in Lao PDR will also increase about 0.23 m. Furthermore, from Nong Khai in Thailand, the water level will slightly increase about 0.39 m over the next five days and at Paksane in Lao PDR water level will increase about 0.35 m due to forecasted rainfall in the upper catchments. Rainfall is forecasted for the area of Paksane next week.

The water levels at these stations are remaining 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 in between 0.05 m and 0.40 m over the next five days. Water level at these stations will stay lower than their LTA level. Rainfall is forecasted for the area 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 0.10 m to 0.45 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 slightly decrease by about 0.25 m over the next five days.

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

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

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

The performance of the weekly flood forecast, with an accuracy and data input evaluation from 21 to 27 September 2021, is presented in **Annex 1**.

[Table 2](#) shows the daily flood forecasting Bulletin issued on September 27. 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**

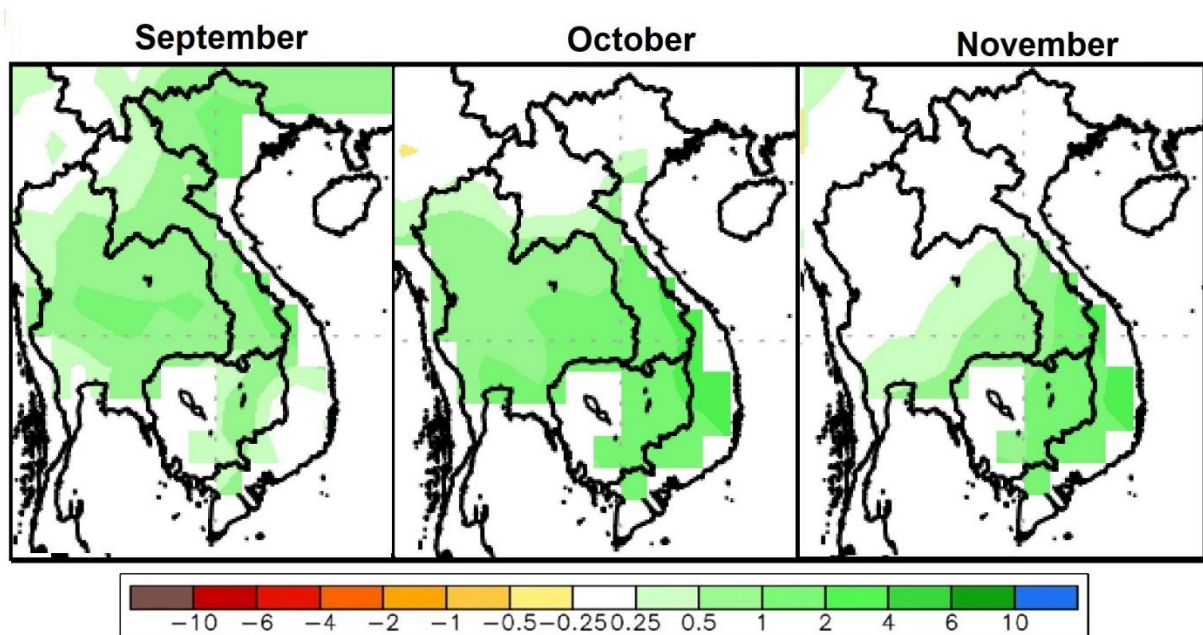
With small rainfall forecasted for next week, flash floods with high level are not expected to take place in the LMB. However, local heavy rain in a short period of time is possible with unexpected short flash floods. The information on flash flood guidance for the next one, three, and six hours is updated twice a day at: <http://ffw.mrcmekong.org/ffg.php>.

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

## 6.4 Drought forecast

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

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



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

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

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

Table 2. Weekly River Monitoring Bulletin.



### Mekong Bulletin

Mekong River Commission Secretariat (MRCS)  
**Regional Flood and Drought Management Centre (RFDMC)**  
 P.O. Box 623 #576, National Road #2, Chak Angre Krom, Meanchey, Phnom Penh, Cambodia  
 Tel: (855-23) 425353, Fax: (855-23) 425363, Email: [floodforecast@mrcmekong.org](mailto:floodforecast@mrcmekong.org)  
**River Flood Forecast: 28 September - 02 October 2021**

Date: 27 September 2021

Location	Country	24-hr Observed Rainfall (mm)	Zero gauge above M.S.L. (m)	Flood level (m)	Alarm level (m)	Observed W. level against zero gauge (m)	Forecasted Water Levels (m)					There is currently no flood warning in place at monitoring sites on the Mekong							
							26-Sep	27-Sep	28-Sep	29-Sep	30-Sep	01-Oct	02-Oct	27	28	29	30	01	02
Jinghong		1.5				535.03	535.29							↑	×	×	×	×	×
Chiang Saen		10.8	357.110	12.80	11.50	2.54	2.45	2.30	2.40	2.43	2.37	2.30		↓					
Luang Prabang		0.0	267.195	18.00	17.50	9.58	9.50	9.40	9.25	9.36	9.47	9.52			↓	↑	↑		
Chiang Khan		21.8	194.118	16.00	14.50	8.23	8.28	8.38	8.42	8.43	8.54	8.63		↑			↑		
Vientiane		1.0	158.040	12.50	11.50	5.61	5.70	5.73	5.80	5.83	5.83	5.93							
Nongkhal		0.0	153.648	12.20	11.40	5.51	5.67	5.77	5.88	5.93	5.95	6.06		↑		↑			↑
Paksane		1.8	142.125	14.50	13.50	6.18	6.21	6.30	6.36	6.42	6.45	6.46							
Nakhon Phanom		29.8	130.961	12.00	11.50	5.01	5.10	5.25	5.35	5.40	5.44	5.46		↑					
Thakhek		35.3	129.629	14.00	13.00	6.20	6.29	6.46	6.57	6.64	6.70	6.73		↑	↑				
Mukdahan		4.9	124.219	12.50	12.00	5.17	5.32	5.50	5.66	5.75	5.80	5.84		↑	↑	↑			
Savannakhet		4.0	125.410	13.00	12.00	3.62	3.75	3.91	4.05	4.12	4.15	4.17		↑	↑	↑			
Khong Chiam		0.0	89.030	14.50	13.50	8.31	8.19	8.10	8.03	8.15	8.25	8.32		↓		↑			
Pakse		6.0	86.490	12.00	11.00	7.12	6.78	6.65	6.57	6.66	6.73	6.78		↓	↓	↓	↑	↑	
Stung Treng		nr	36.790	12.00	10.70	8.30	8.24	7.93	7.75	7.66	7.73	7.76		↓	↓	↓	↓	↑	
Kratie		6.5	-0.101	23.00	22.00	17.68	18.51	18.38	18.00	17.73	17.52	17.56		↑	↓	↓	↓	↓	↑
Kompong Cham		10.5	-0.930	16.20	15.20	10.61	11.74	12.30	12.15	11.80	11.56	11.37		↑	↑	↓	↓	↓	↓
Phnom Penh (Bassac)		0.0	-1.020	12.00	10.50	6.36	6.98	7.28	7.20	7.10	7.00	6.93		↑	↑	↓	↓	↓	↓
Phnom Penh Port		-	0.070	11.00	9.50	5.38	5.99	6.30	6.22	6.12	6.03	5.95		↑	↑	↓	↓	↓	↓
Koh Khel (Bassac)		nr	-1.000	8.40	7.90	5.70	6.18	6.47	6.42	6.35	6.29	6.25		↑	↑	↓	↓	↓	↓
Neak Luong		nr	-0.330	8.00	7.50	4.52	4.98	5.45	5.66	5.60	5.45	5.34		↑	↑	↑	↓	↓	↓
Prek Kdam		nr	0.080	10.00	9.50	5.41	5.86	6.15	6.08	6.00	5.93	5.88		↑	↑	↓	↓	↓	↓
Tan Chau		0.2	0.000	4.50	3.50	1.70	1.94	2.05	2.10	2.13	2.10	2.00		↑	↑	↑	↑	↓	↓
Chau Doc		3.0	0.000	4.00	3.00	1.45	1.60	1.69	1.72	1.75	1.72	1.61		↑	↑	↑	↑	↓	↓

REMARKS:

:- not available.  
 nr: no rain.

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

**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 from Kratie downstream.  
**Flood stage** is when the flood level exceeds. A flood level is determined by each Member Country.  
**Alarm stage** is when the water level ranges between alarm and flood levels.  
**Alarm situation** is when the water level is forecasted to reach the flood stage within the next three days.

River Flood Forecaster

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 September 21-27, including the lower part in Cambodia and Viet Nam, varying from 2.10 mm to 203.10 mm, and considered high compared with last week.

Based on the forecasted satellite data, rainfall is forecasted for some areas of the LMB with value ranging from 20 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 28 September to 4 October 2021.

### 7.2 Water level and its forecast

According to MRC's observed water level data, the outflows at Jinghong hydrological station showed a significant decrease over the monitoring period from 10 to 27 September 2021. It dropped **about 0.83 m from 535.98 m on 10 Sept to 535.15 on 27 Sept 2021 (recorded on 7:00 am)**. The outflows decreased from 1,318 m<sup>3</sup>/s on Sept 10 to 761 m<sup>3</sup>/s on Sept 27, 2021. From September 21 to 27, water level at this station went down about 0.50 m and dropped 0.04 m lower than its historical minimum value.

Along with the significant low outflow from Jinghong upstream, water levels of monitoring stations at Chiang Saen in Thailand also decreased about 0.25 m from 21 to 27 September 2021. However, from Chiang Khan in Thailand to Vientiane in Lao PDR, water levels increased about 0.55 m during 21-27 September due to some average rainfall in the area and dam operation. Water levels from Nakhon Phanom in Thailand to Savannakhet in Lao PDR were slightly increasing. Water levels from the stretches of the river from Stung Treng to Kratie and at Kampong Cham in Cambodia were significantly increasing, due to heavy rainfall in 3S areas and following the same trend of the upstream flow (at Pakse).

Over the next five days, the water levels from Khong Chiam to Pakse and from Stung Treng to the lower part at key stations in Cambodia are expected to decrease between 0.05 m and 0.40 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 accumulated average rainfall forecasted in the inflow catchments of the Tonle Sap Lake.

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

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

Since the fourth week of July 2021, water levels across most monitoring stations in the LMB have significantly dropped to the level lower than their LTA (from upper to lower stretches within the LMB) but are likely to start rising from 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 amount of rainfall for the coming week as mentioned earlier in [section 6.1](#), the major flash floods are not 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**

Both meteorological and agricultural indicators show wet conditions over most parts of the LMB from September 18 to 24. The region did not face any drought threat during the monitoring period.

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

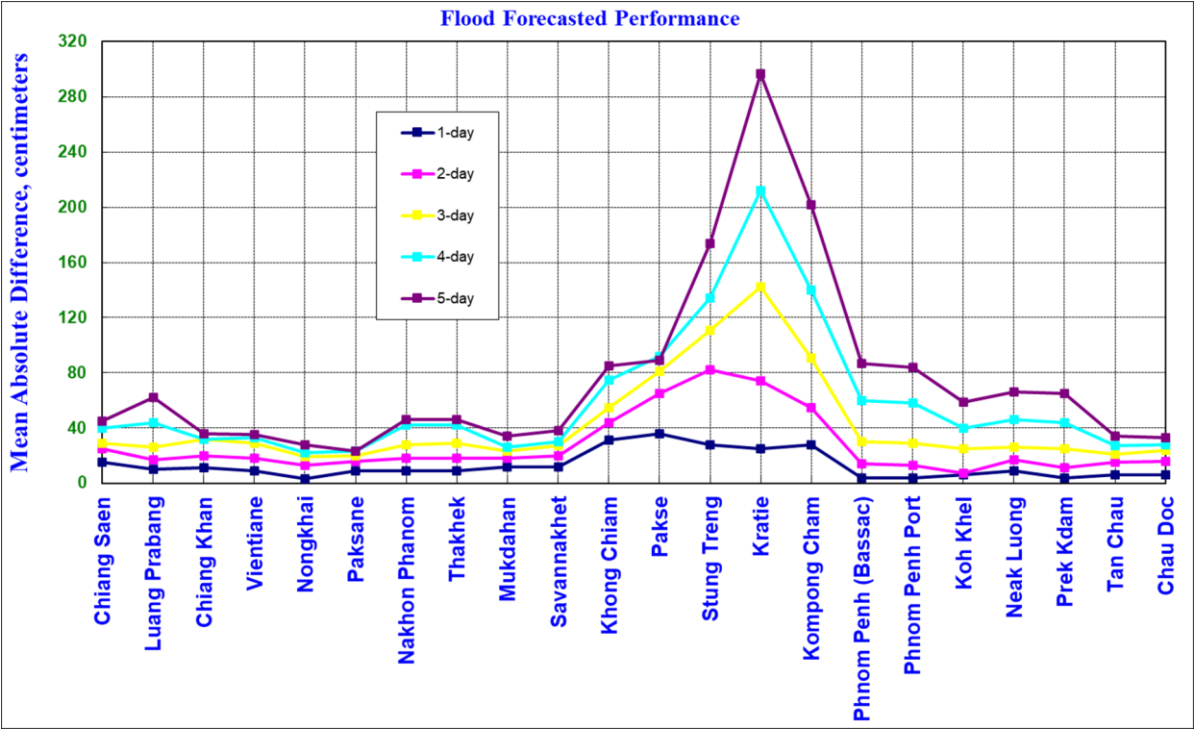
# Annex 1: Performance of the weekly flood forecasting

## Accuracy

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

The adjustment of flood forecasting outcomes from the flood forecasting system requires flood forecasters to have extensive knowledge in hydrology and statistical modelling for estimating the relationships between stations upstream and downstream in the Mekong River Basin. Flood forecasting performance presented in the graph below shows the average flood forecasting accuracy at each key station along the Mekong mainstream from 21 to 27 September 2021.

The forecasting values from 21 to 27 September show that the overall accuracy is fair for a one-day to three-day forecast in lead time at stations in the middle to the lower parts of the Mekong River from Pakse to Kratie 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, including the 3S (Stung Treng and Kratie).
- Khong Chiam, Pakse, Stung Treng and Kratie stations have been affected by heavy



rainfall from Vietnam and some hydropower operations on Sekong, Sesan and Sre Pok (water retention and release). Rainfall always accumulates at this spot, which could be causing rapidly high-water levels.

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

### 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 21 to 27 September, 2021.

**Table B1:** The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 21 to 27 September, 2021 in cm

Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc
1-day	15	10	11	9	3	9	9	9	12	12	31	36	28	25	28	4	4	6	9	4	6	6
2-day	25	17	20	18	13	16	18	18	18	20	44	65	82	74	55	14	13	7	17	11	15	16
3-day	29	26	32	29	19	20	28	29	23	27	55	81	111	142	91	30	29	25	26	25	21	24
4-day	40	44	32	33	22	23	42	42	26	30	75	92	134	212	140	60	58	40	46	44	27	28
5-day	45	62	36	35	28	23	46	46	34	38	85	89	174	297	202	87	84	59	66	65	34	33

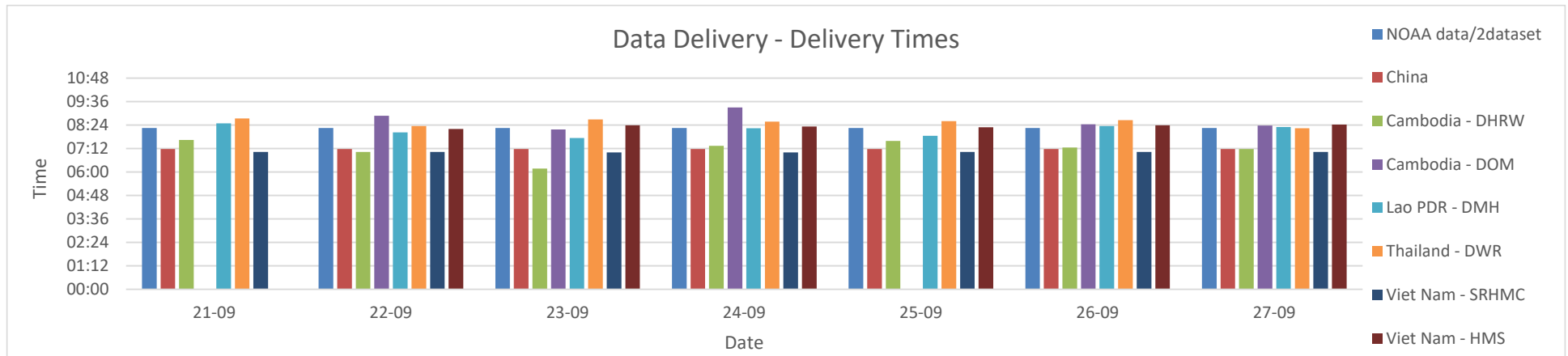
**Table B2:** The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 21 to 27 September, 2021 in %

Lead-time Forecasted	Chiang Saen	Luang Prabang	Chiang Khan	Vientiane	Nongkhai	Paksane	Nakhon Phanom	Thakhek	Mukdahan	Savannakhet	Khong Chiam	Pakse	Stung Treng	Kratie	Kompong Cham	Phnom Penh (Bassac)	Phnom Penh Port	Koh Khel	Neak Luong	Prek Kdam	Tan Chau	Chau Doc	Average
1-day	71.4	71.4	57.1	42.9	57.1	71.4	42.9	57.1	57.1	57.1	71.4	71.4	57.1	71.4	57.1	57.1	57.1	71.4	71.4	71.4	85.7	57.1	63.6
2-day	50.0	83.3	66.7	66.7	50.0	83.3	50.0	50.0	66.7	66.7	50.0	50.0	33.3	50.0	66.7	66.7	66.7	66.7	50.0	66.7	66.7	50.0	59.8
3-day	60.0	80.0	60.0	80.0	60.0	60.0	60.0	60.0	80.0	40.0	80.0	40.0	60.0	60.0	40.0	60.0	60.0	40.0	60.0	40.0	60.0	40.0	58.2
4-day	50.0	75.0	75.0	75.0	75.0	50.0	50.0	50.0	50.0	25.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	25.0	52.3
5-day	66.7	66.7	66.7	66.7	66.7	33.3	33.3	33.3	66.7	66.7	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	66.7	66.7	47.0

**Table B3: Overview of performance indicators for the past 7 days from 21 to 27 September 2021**

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
	FF completed and sent (time)	Stations without forecast	FF2 completed and sent (time)	Weather data available (time)	NOAA data	China	Cambodia - DHRW	Cambodia - DOM	Lao PDR - DMH	Thailand - DWR	Viet Nam - SRHMC	Viet Nam - HMS	NOAA data/2dataset	China/2	Cambodia - DHRW/15	Cambodia - DOM/34	Lao PDR - DMH/32	Thailand - DWR/13	Viet Nam - SRHMC/6	Viet Nam - HMS/39
<b>2021</b>																				
<i>week</i>	10:16	00:00	-	-	08:15	07:10	07:09	08:37	08:08	08:32	07:00	08:19	0	0	0	68	58	14	6	39
<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 21 to 27 September 2021**



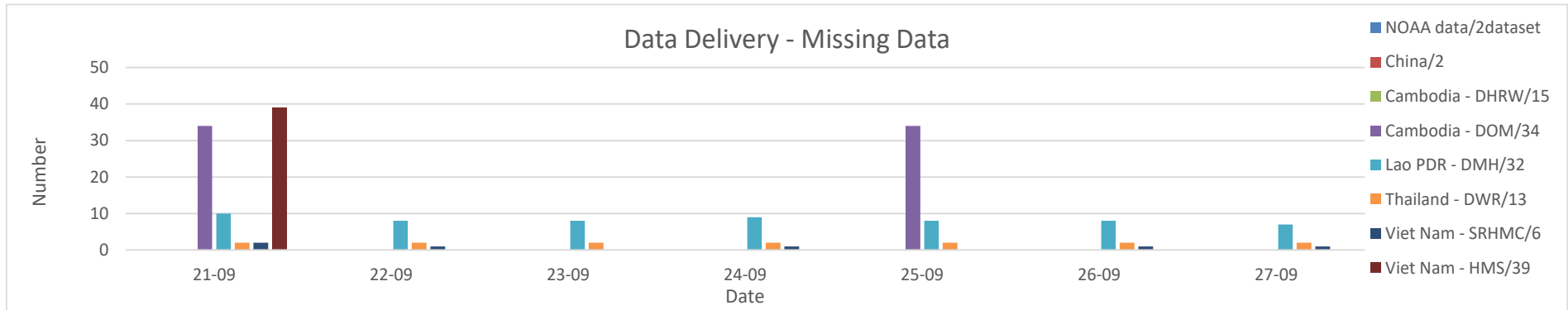
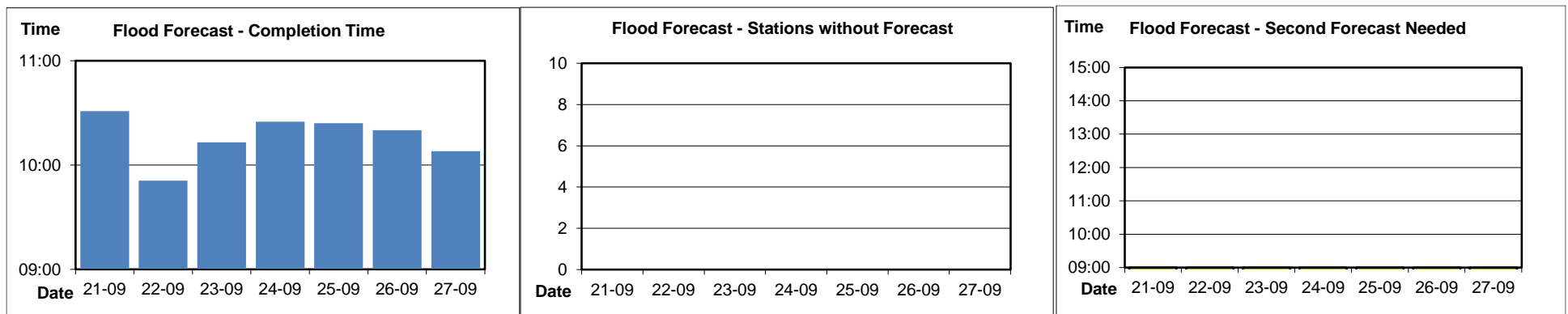


Fig. B5: Missing data for the past 7 days from 21 to 27 September 2021

Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 21 to 27 September 2021





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