Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin

18 – 24 August 2020

Prepared by
The Regional Flood and Drought Management Centre
25 August 2020

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1 Introduction

This Weekly Wet Season Situation Report presents a preliminary analysis of the weekly hydrological situation in the Lower Mekong River Basin (LMB) from **18 to 24 August 2020**. The trend and outlook for water levels are also presented.

This analysis is based on the daily hydro-meteorological data provided by the Mekong River Commission (MRC) Member Countries – Cambodia, Lao PDR, Thailand, and Viet Nam – and on satellite data.

The 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
- 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 Thailand Meteorology Department (TMD) were used to verify weather conditions in the LMB.

Since early August 2020, moderate and above-normal rainfall has been observed in the LMB. The data from the TMD predict that instances of low pressure and tropical cyclones may move closer to the Mekong region in August and continue to September, when heavy rainfall often occurs in the Mekong region. The TMD also predicts that scattered thundershowers throughout August will continue in the north-eastern part of Thailand (within the Mekong region).

Figure 1 presents the weather map of 23 August 2020, which shows two lines of low pressure of the Monsoon Trough crossing the northern part of the Mekong region, which can bring some rainfall over the next few days.

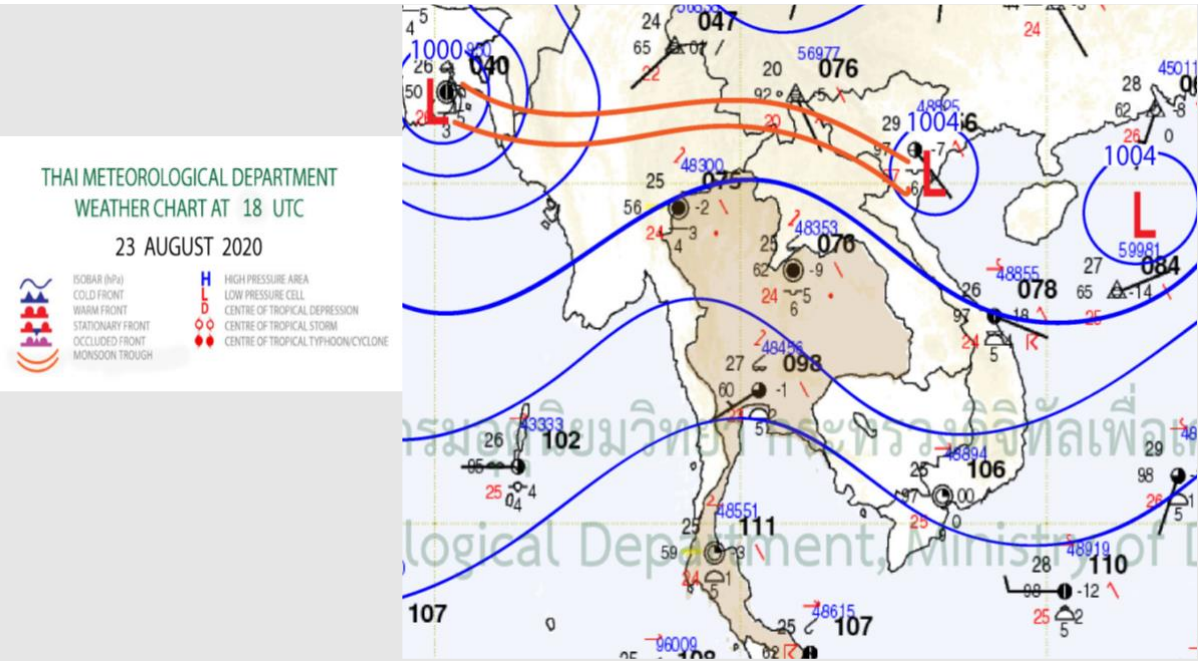


Figure 1. Summary of weather conditions over the LMB

According to the Asian Specialised Meteorological Centre (ASMC), increased shower rainfall over the Mekong sub-region, above-normal rainfall, and hotspot activities will occur from August to September. In the southern ASEAN region, rainfall over most parts of the equatorial region is predicted to be above normal in August and September.

Consequently, from August to September, there is an increasing chance of moderate to above average rainfall for most Asian countries, especially in the Mekong region. Figure 2 shows the predicted rainfall in August in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

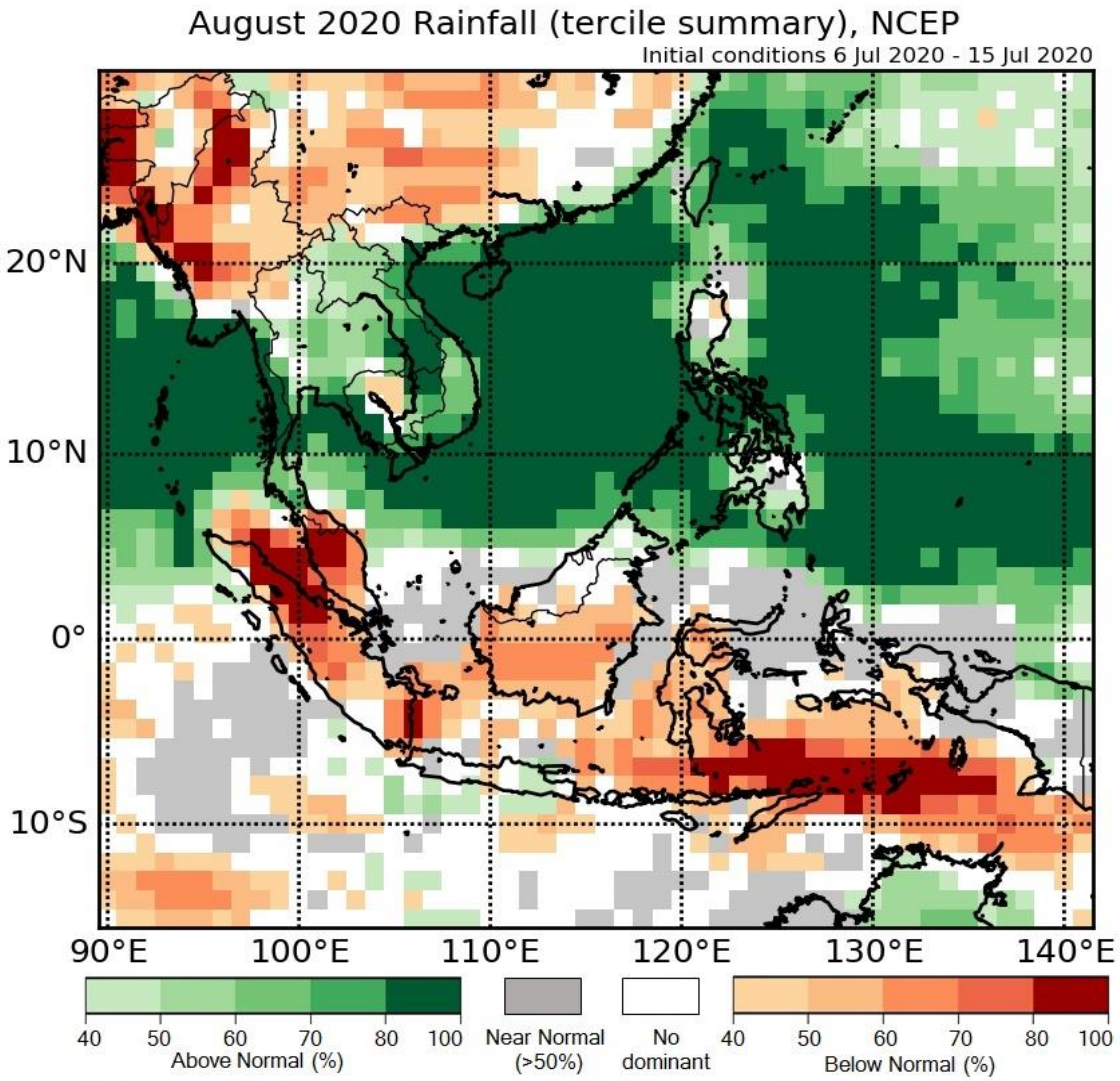


Figure 2. Predicted rainfall over Asian Countries by ASMC

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

There were neither tropical depressions nor tropical storms in the LMB during this reporting week. However, there were two lines of low pressure moving across the upper part of the Mekong Region which could absorb some rainfall in the northern part of the LMB.

Rainfall patterns over the LMB

This week's rainfall is considered above average, varying from 2.4 mm to 389 mm at different stations along the LMB from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam. The highest rainfall during this week was accumulated in the middle part of the LMB from Vientiane to Paksane area (rainfall from 215 mm to 389 mm), much similar to last week. The weekly total observed rainfall at these selected stations is shown in Figure 3.

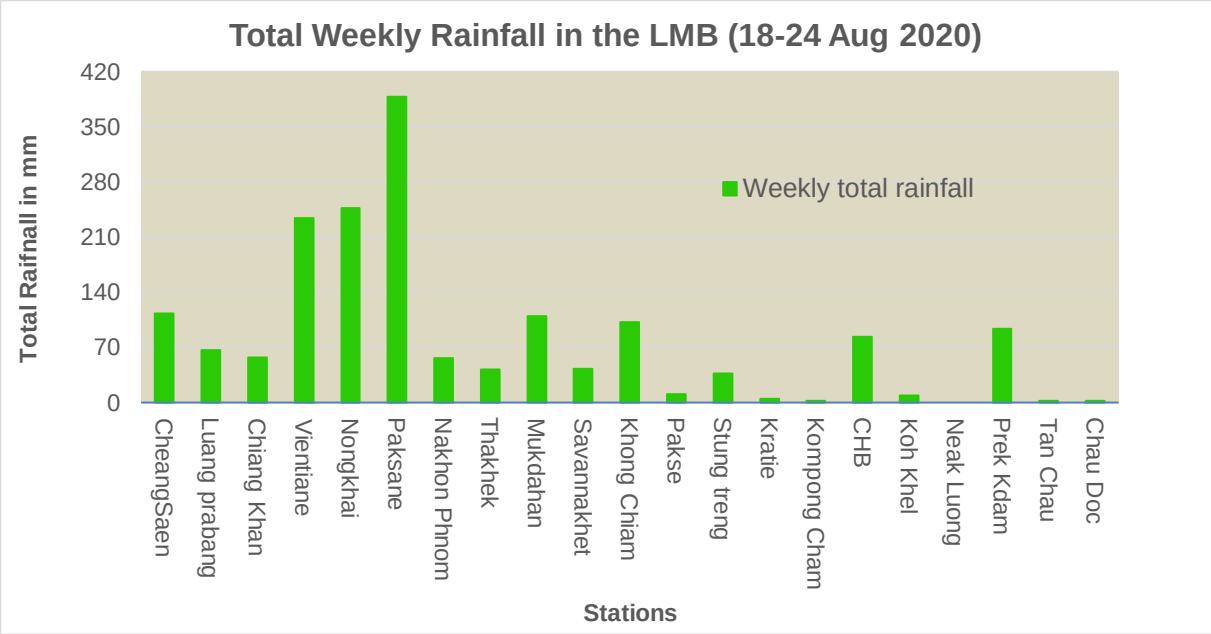


Figure 3. The weekly total rainfall over the LMB

To verify area rainfall distribution, Figure 4 shows a map of the accumulated weekly rainfall based on observed data provided by the MRC Member Countries – Cambodia, Lao PDR, Thailand and Viet Nam – from 17 to 24 August.

The situation during this reporting week is comparable to that of last week. During the last reporting period, the amount of rainfall (50 – 450 mm) was also above average but was slightly above this week's quantity.

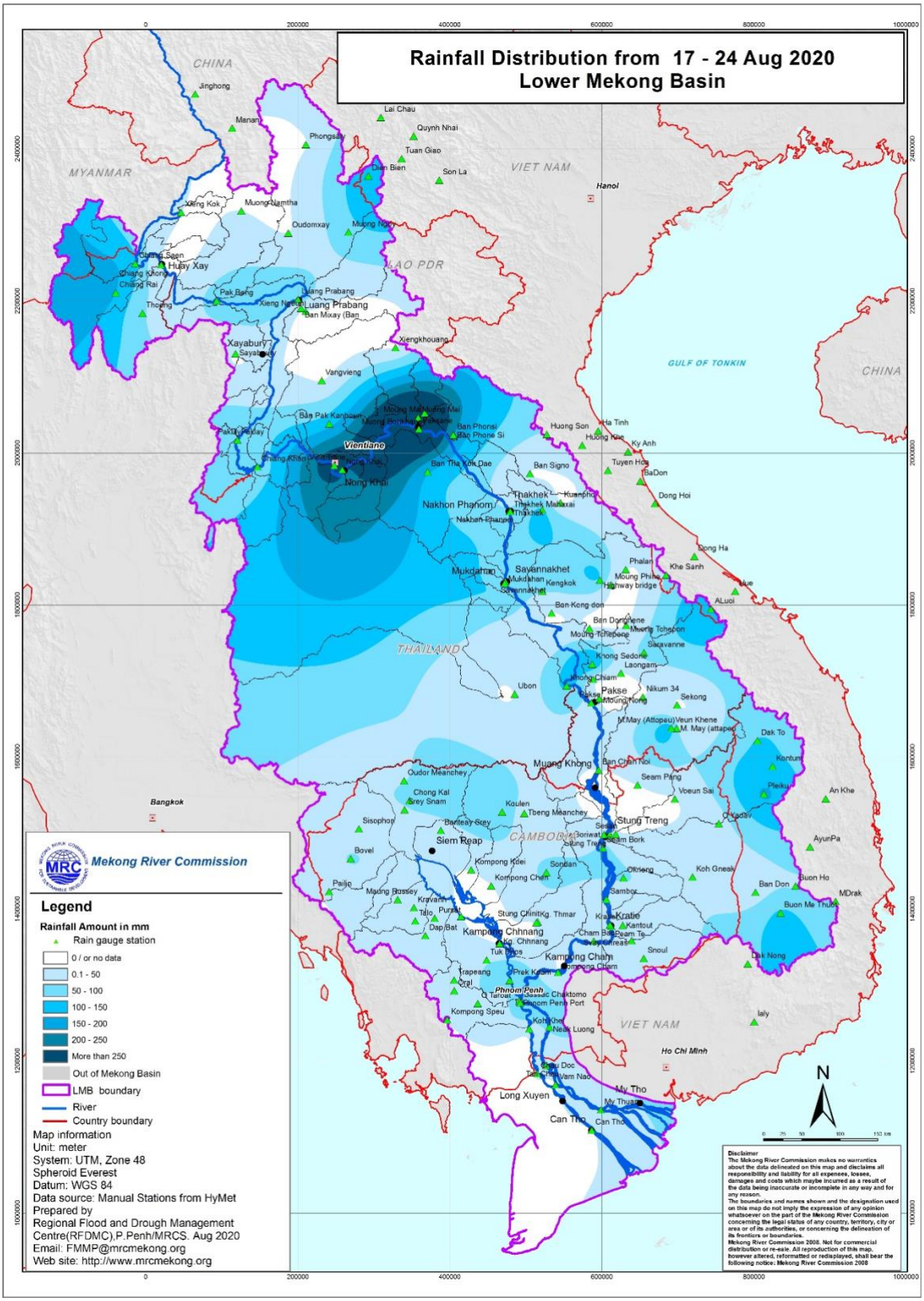


Figure 4. The weekly rainfall distribution over the LMB

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 to capture mainstream flows entering from the UMB; at Vientiane to present flows generated by climate conditions in the upper part of the LMB; at Pakse to investigate flows influenced by inflows from the larger Mekong tributaries; at Kratie to capture overall flows of the Mekong Basin; and at Tan Chau and Chau Doc to monitor flows to the Delta.

The key stations along the LMB and their respective model application for River Flood Forecasting during the wet season from June to October and River Monitoring during the dry season from November to May are presented in Figure 5. The hydrograph for each key station is available from the MRC's River Flood Forecasting: http://ffw.mrcmekong.org/overview.php.

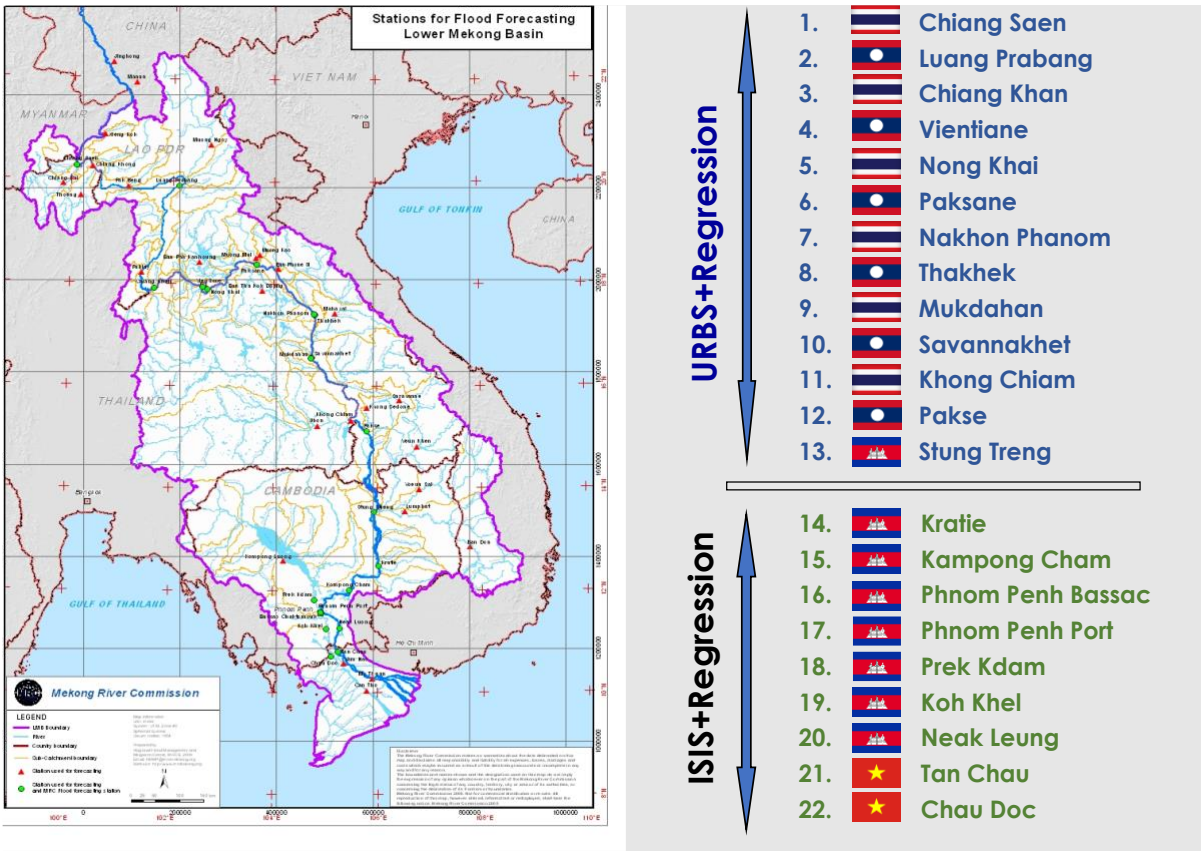


Figure 5. Key stations and model application for River Monitoring and Flood Forecasting

Chiang Saen and Luang Prabang

Water levels from 18 to 24 August at Chiang Saen station were decreasing from 4. 83 metres to 4.17 metres. Main possible causes of such a phenomenon are believed to be a less quantity of inflow volume from the upstream, stemming from Lao PDR, Myanmar and Lancang (Mekong) in China, and last week's lower rainfall contributed by catchment inflows. When compared to last week, this week's water levels were very much similar.

Water levels at Luang Prabang monitoring station in Lao PDR were fluctuating very quickly between, ranging between –0.95 and 0.72 metres during the reporting period. Compared to last week, the figure shows a decreasing number from 11.65 metres to 11.36 metres. This level is higher than that of 2019 but remains lower than its long-term average (LTA).

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

Chiang Khan, Vientiane-Nong Khai and Paksane

Water levels at Chiang Khan increased from 9.32 metres last week to 10.56 metres this week, moving closer to the average threshold value. Such a situation is believed to have been contributed by the Xayaburi dam at the upstream. Compared to this time last year, water levels at Chiang Khan is 2 to 3 metres higher.

Downstream water levels from Vientiane to Paksane followed the same direction. Contribution from upstream inflows and sub-catchments is likely the main reason. The fluctuation of water levels at these stations varied slightly from 0.13 to 0.63 metres and is much different from last year's figure, which varied greatly from -0.04 to 0.72 metres.

Nakhon Phanom to Pakse

Similarly, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR were increasing during the reporting period, ranging between 0.06 and 0.60 metres. Surplus rainfall from upstream and its adjacent catchments is likely the cause of the increase. Nevertheless, although the levels are around 0.5 metres higher than those of last year, they are still lower than the LTA value.

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

Like many of the upstream stations, water levels at Stung Treng, Kratie, Kampong Cham, Chaktomuk, Koh Khel, Phnom Penh Port and Prek Kdam stations in Cambodia were increasing from 18 to 24 August, varying from 0.01 to 0.63 metres. This week's water levels at these stations are between their minimum and LTA levels and slightly higher than 2019's figures.

Tidal stations at Tan Chau and Chau Doc

Like last week, water levels at the two tidal stations of Tan Chau and Chau Doc were fluctuating below their LTAs due to daily tidal effects from the sea.

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 (TSL). This phenomenon normally takes place from mid-May to mid-October.

Figure 6 shows the seasonal changes of the inflow/reverse flow and the outflow of the TSL at Prek Kdam in comparison with the flows of 2018 and 2019, and their LTA level (1997-2019). Up to 24 August of this reporting period, **it is observed that the main reverse flow into the TSL has started since August 4. There were also two extremely small instances of the reverse flow in July but they were not significant**. The recorded incident very much matches the record on reverse flow into TSL by the PMFM's (Procedures for the Maintenance of Flows on the Mainstream) tool on Article 6B (monitoring area). The delay of the reverse flow was due to the low water levels on the Mekong mainstream which were caused by deficit rainfall in upper sub-catchment areas, among other factors.

Although the reverse flows have started since August 4, the water volume of the Lake up to this point has been considered critical as it is still lower than its minimum level. Figure 7 shows seasonal changes in monthly flow volume up to August 24 for the TSL compared with the volumes in 2018, 2019, and their LTA and the fluctuating levels (1997-2019). It shows that in early August water volume of the Lake was at a critical level, compared with last year (2019) figure and historical minimum levels at the same period. Table 1 shows the monthly change in flow volume of the TSL and the critical flow volume of the TLS in July and early August 2020 compared to its historical minimum value and volumes of 2018 and 2019. This reveals that the TSL is still affected by low inflows from the Mekong River and insufficient rainfall in the surrounding sub-catchments.

The low inflows (inflows from the Mekong River and from tributaries) in the early wet season of 2020 has resulted in the very critical situation of the TSL. This demonstrates the influence of the relationships between the reverse flows, water levels of the Mekong River, and the flow direction in the complex hydraulic environment of the TSL during this wet season. The data show that more than half of the annual inflow volume into the lake originates from the Mekong mainstream. Thus, flow alterations in the mainstream could have direct impacts on the Tonle Sap Lake water levels and on hydrology.

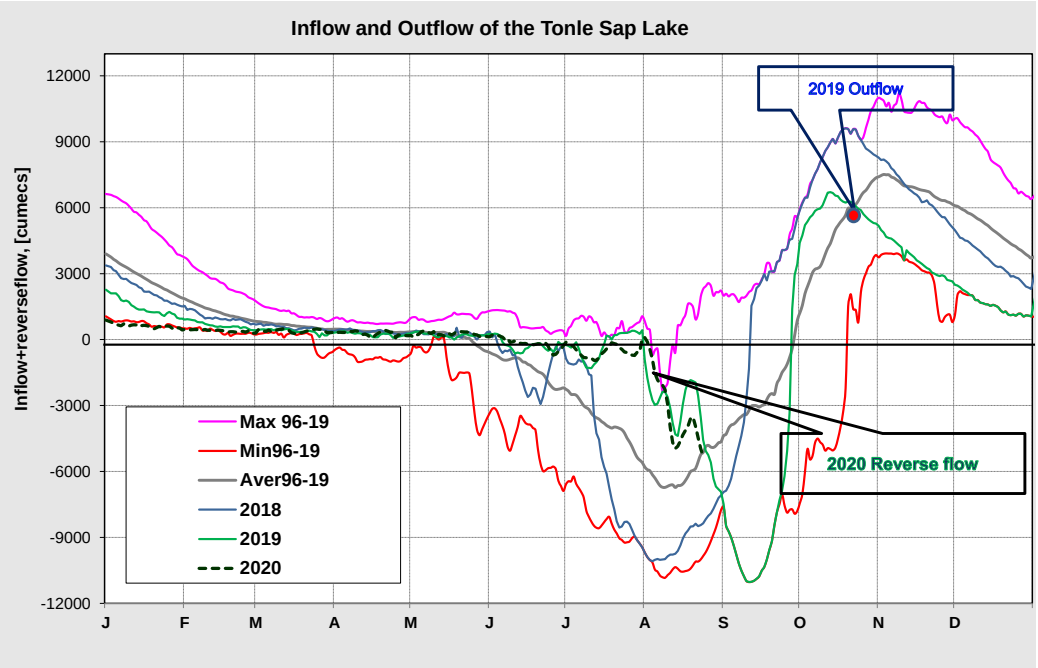


Figure 6. The seasonal change of inflows and outflows of Tonle Sap Lake

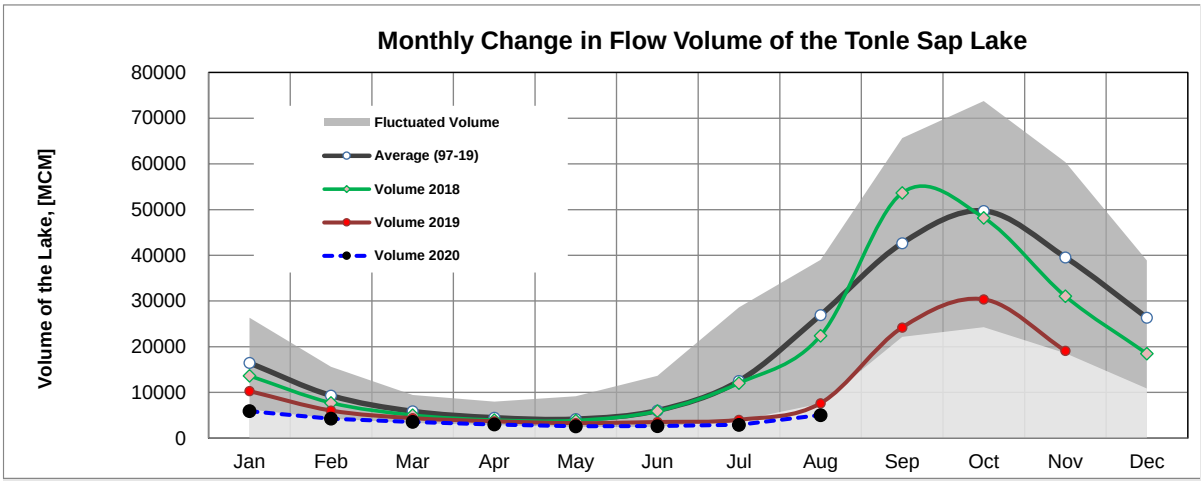


Figure 7. The seasonal change in monthly flow volume of Tonle Sap Lake

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]
Jan	16452.95	26357.53	6272.01	13633.41	10285.31	5906.80
Feb	9312.36	15596.22	4281.41	7729.72	6019.30	4264.19
Mar	5868.92	9438.24	3350.92	5037.06	4354.62	3553.99
Apr	4474.98	8009.14	2875.42	3956.47	3667.47	2992.61
May	4166.07	9176.93	2417.81	3864.00	3266.43	2594.92
Jun	6034.10	13635.01	2470.54	5919.18	3517.06	2641.88
Jul	12502.58	28599.56	3832.51	12024.96	4001.99	2925.86
Aug	26934.35	39015.12	7554.93	22399.65	7622.71	5029.90
Sep	42644.05	65632.35	22180.73	53639.54	24194.19	
Oct	49698.19	73757.23	24276.79	48193.08	30358.38	
Nov	39542.58	60367.33	18576.01	31036.07	19112.65	
Dec	26325.13	38888.95	10869.43	18469.21	10577.29	
	Critical situation, comapred with historical Min values					
	Normal condition, compared with LTA (Long term average)					
	Low volume situation, comapred with LTA values					
Unit: Million Cubic Meter (1 MCM= 0.001 Km^3)						

4 Flash Flood in the Lower Mekong Basin

During 17-24 August 2020, flash floods were recorded in some locations in the elevated mountainous areas of Lao PDR within the LMB due to heavy rain. According to the MRC-Flash Flood Guidance System (FFGS) and analysis, the events were detected at the provinces of Phongsaly, Oudomxay, Luang Prabang and Huaphanh and were considered as low risk. Figure 8 shows the Flash Flood Guidance (FFG) results for the next 01, 03 and 06 hours produced as on 18 August 2020 at 00:00 UTC (07:00 AM local time).

Table 2: Detected flash flood in Lao PDR on 18 Aug 2020

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 18/08/2020 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
Phongsaly	May	KIOKACHAM	North	Low-Risk	Phongsaly	May	KIOKACHAM	North	Low-Risk	Phongsaly	May	KIOKACH	North	Low-Risk
Oudomxay	Xay	YAO NOY	Northwest	Low-Risk	Oudomxay	Xay	YAO NOY	Northwest	Low-Risk	Oudomxay	Xay	YAO NOY	Northwest	Low-Risk
Luangprabang	Nambak	KIOUCHADI	North	Low-Risk	Luangprabar	Nambak	KIOUCHADI	North	Low-Risk	Luangprabar	Nambak	KIOUCHA	North	Low-Risk
					Huaphanh	Viengthon	POUNGTHOU	Eastern	Low-Risk	Huaphanh	Viengthon	POUNGTI	Eastern	Low-Risk

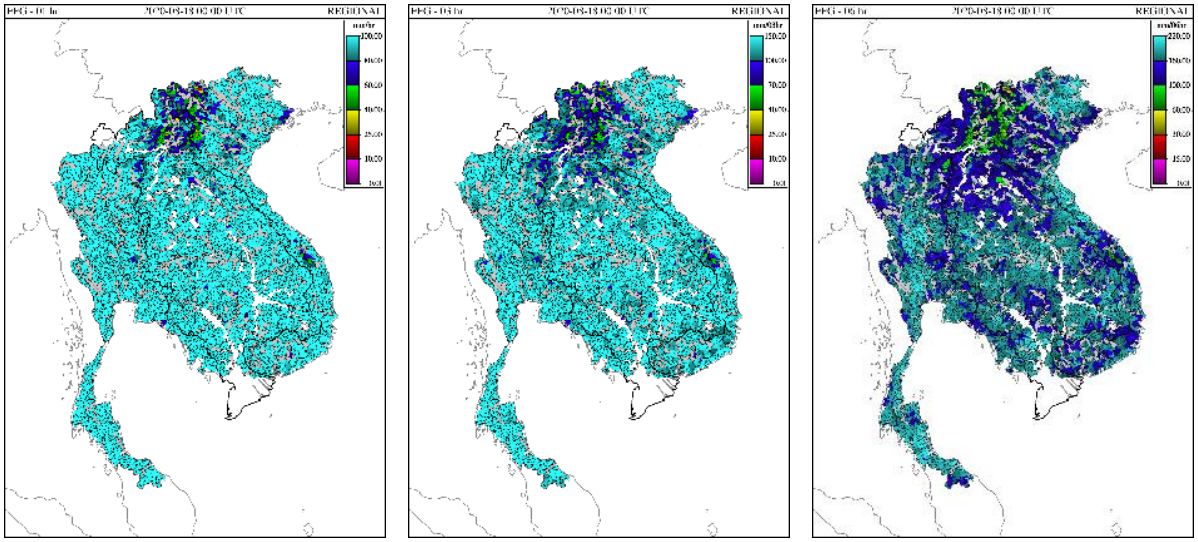


Figure 8. Flash Flood Guidance (FFG) for the next 1, 3 and 6 hours produced on Aug 18 at 00:00 UTC

5 Drought Monitoring in the Lower Mekong Basin

Droughts of the LMB are monitored based on three main indicators. The first indicator is a Meteorological Index using the Standardised Precipitation Index (SPI) with one-week time span; the second is the Agricultural Index using the weekly Soil Moisture Anomaly (SMA), and the third one is the weekly Combined Drought Index (CDI) as an integration between the weekly SPI and SMA with equal weighting factors.

Daily observing data from around 100-145 stations of HYMET supported by Member Countries are used together with satellite rainfall data called PERSIANN-Cloud Classification System (PERSIANN-CCS) developed by the Center for Hydrometeorology and Remote Sensing (CHRS, http://chrs.web.uci.edu), the University of California, Irvine to form a spatial weekly SPI1 for meteorological monitoring of the LMB (Figure 9). A 40-km buffer of the HYMET stations for spatial coverage of SPI values is used for this purpose.

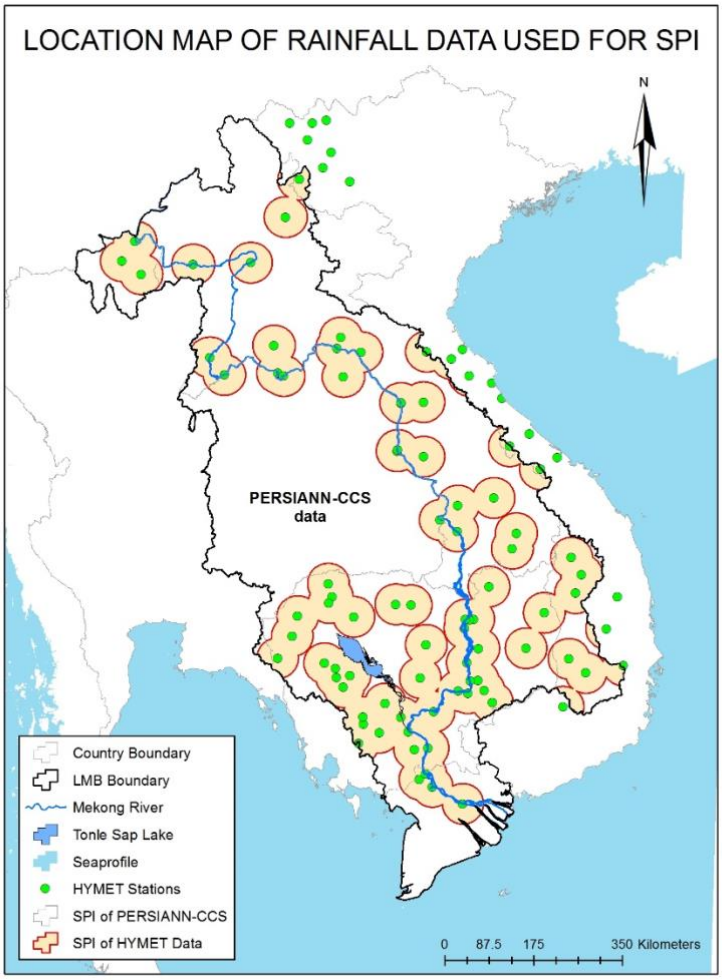


Figure 9. Map of rainfall data used for weekly SPI

For soil moisture, the real-time daily Average Soil Moisture data from the MRC-FFGS are used to compute the weekly soil moisture anomaly model for the agricultural indicator. The anomaly values are then fitted to {(-3) -(3)} to be consistent with the weekly SPI for weekly CDI calculation. Since FFGS does not include the Mekong Delta area, SMA is marked with "No data" for the Mekong Delta and so is the CDI.

To match with the SPI results which form on a weekly basis starting from Thursdays to Wednesdays (US 53 weeks system per year), SMA and CDI are also counted from Thursday to Wednesday for weekly monitoring.

Weekly drought monitoring from 13-19 August 2020

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

The recent week SPI values show that the LMB has received a pretty good amount of rain, a comparable average amount, in most part of the LMB from 13-19 August 2020. Last week (06-12 August), the condition was worse in the north, especially in Phongsaly and Luangnamtha of Lao PDR as the condition was severely dry.

Figure 10 shows that this reporting week the driest parts are still in northern LMB covering some parts of Chiang Rai of Thailand, and Luangnamtha and Phongsaly of Lao PDR, the bordering area between Champasack of Lao PDR and Ubon Ratchathani of Thailand in the middle part, as well as some part of Kampong Cham of Cambodia in southern LMB. However, those dry locations are mostly considered as 'moderately dry condition' which does not create significant impacts, as opposed to 'extremely dry'.

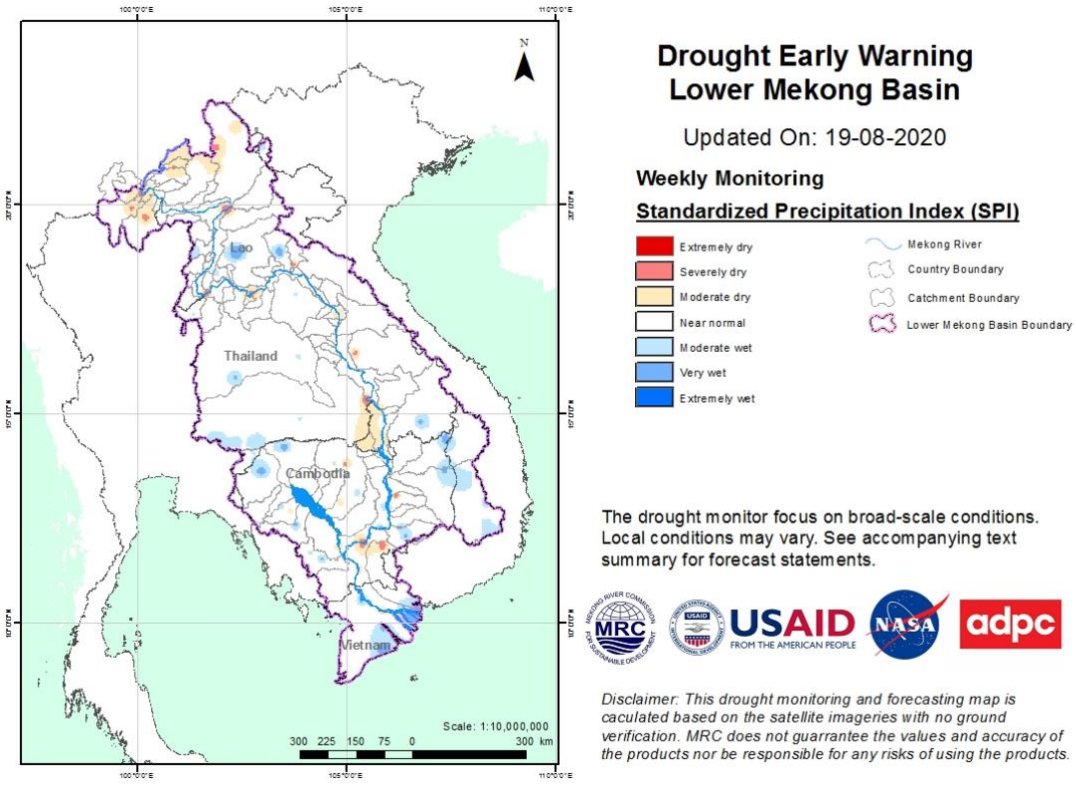


Figure 10. Weekly standardised precipitation index from 13-19 August 2020

- **Weekly Soil Moisture Anomaly (SMA)**

Slightly different from the meteorology, the agricultural indicator, as shown in Figure 11, indicates that the driest soil moisture condition is found in the east of Savannakhet and Saravane of Lao PDR, with severely and extremely dry conditions. The situations of moderately and severely dry are found in Lao PDR's northern Sekong, north-eastern Khammuane, southern and northern Xayabury, and southern Luang Prabang; and Thailand's southern Si Saket, the many parts of Ubon Rachathani, central Nakhon Phanom, western Loei, Chiang Rai, and northern Kon Tum. Some parts are covered by moderately dry but not significant.

No dry soil is found in the Cambodian territory during the monitoring period.

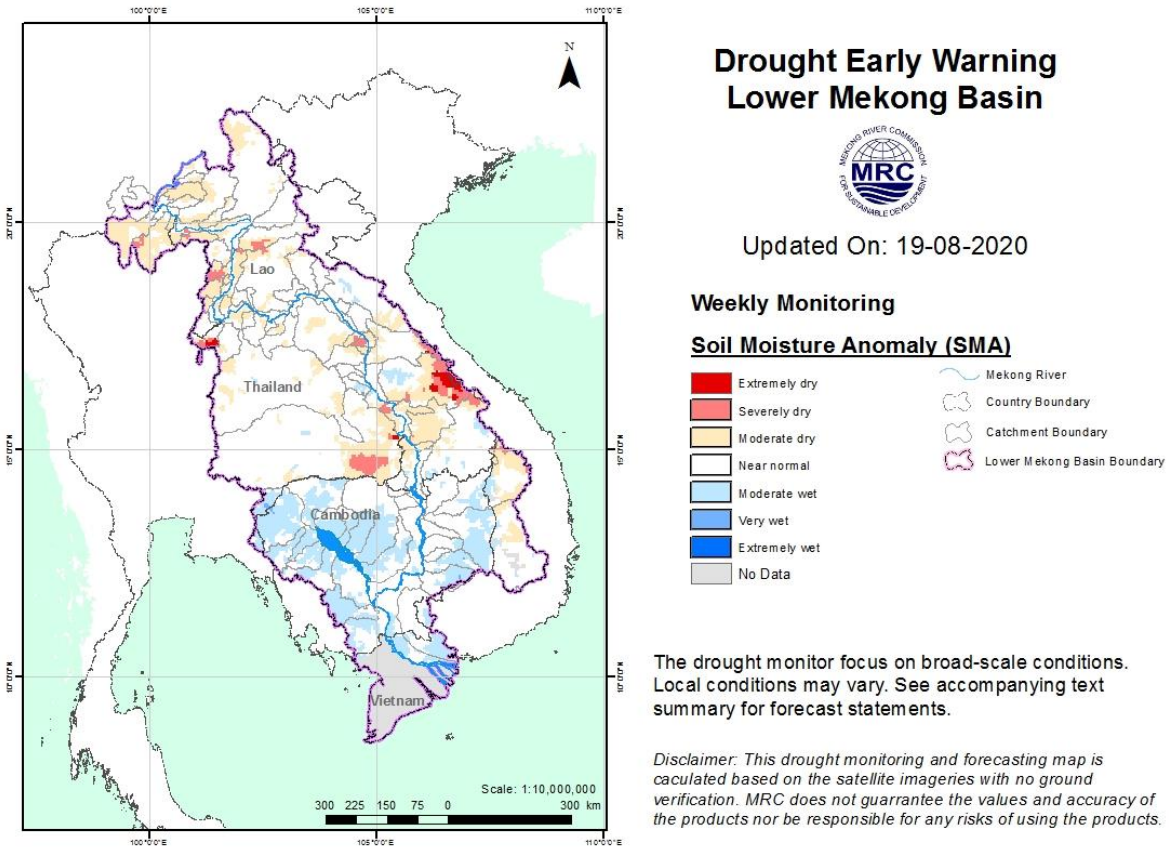


Figure 11. Weekly Soil Moisture Anomaly from 13-19 August 2020

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

The overall drought condition through combined drought index shows no significant threats to the LMB during the forecasting week from 13 to 19 August. Figure 12 shows that the CDI for this reporting period looks similar to that of last week. But a better condition in the north was observed when there were some severe and moderate drought conditions last week in some part of Phongsaly and Luangnamtha of Lao PDR.

There are some severe and moderate drought conditions in Quang Tri of Viet Nam, which shares the territory with the LMB, northern and eastern Ubon Ratchathani and central part of

Nakhon Phanom of Thailand. Apart from this, some locations with yellow colour in the CDI map below faced moderate but not significant drought conditions.

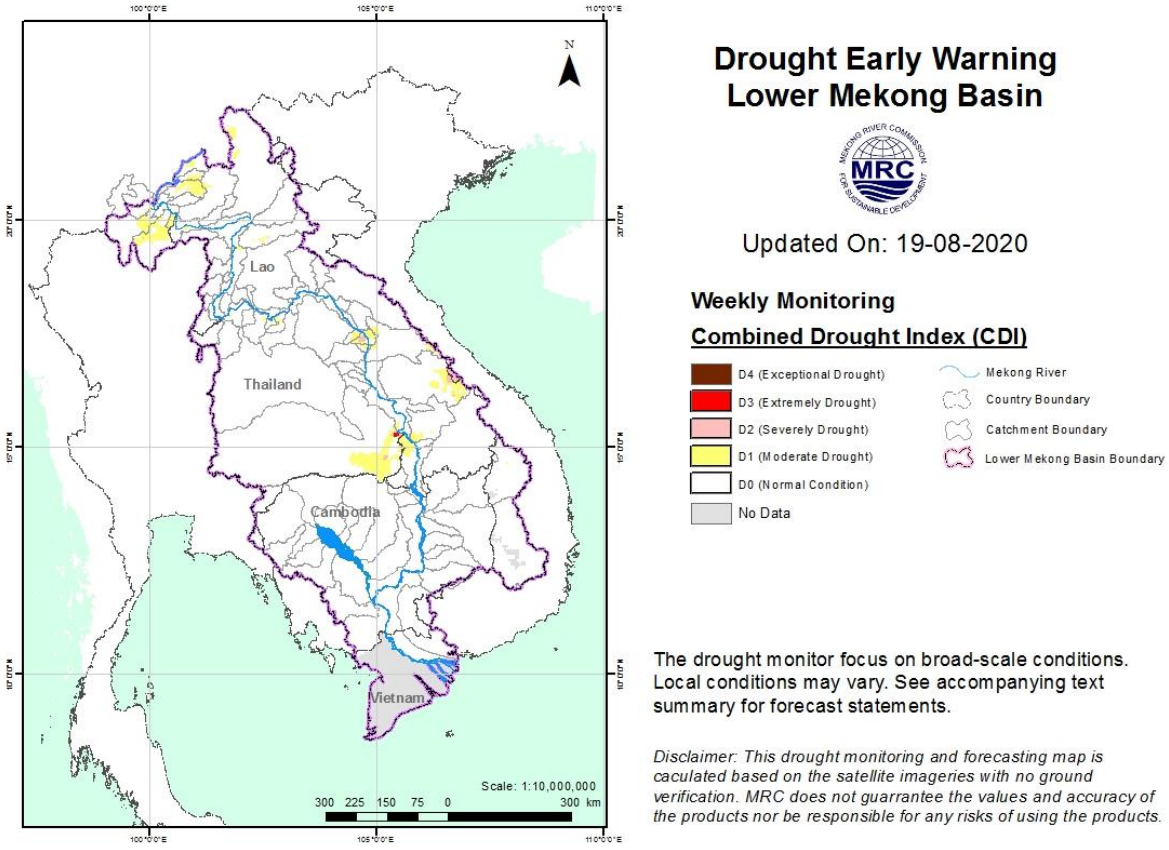


Figure 12. Weekly Combined Drought Index from 13-19 August 2020

6 Weather and Water Level Forecast and Flash Flood Information

6.1 Weather and rainfall forecast

According to forecasted information from Thailand's TDM, the monsoon rain is predicted to come across the upper north of the LMB, moving towards a low-pressure cell over the upper part of the region during the first half of the coming week (see Figure 13). It will then strengthen and move southwards, forming the southwest monsoon over the LMB throughout the week. This phenomenon will bring small and moderate rainfall of approximately at 20 – 40 mm/24hrs over most part of the LMB during the period with.

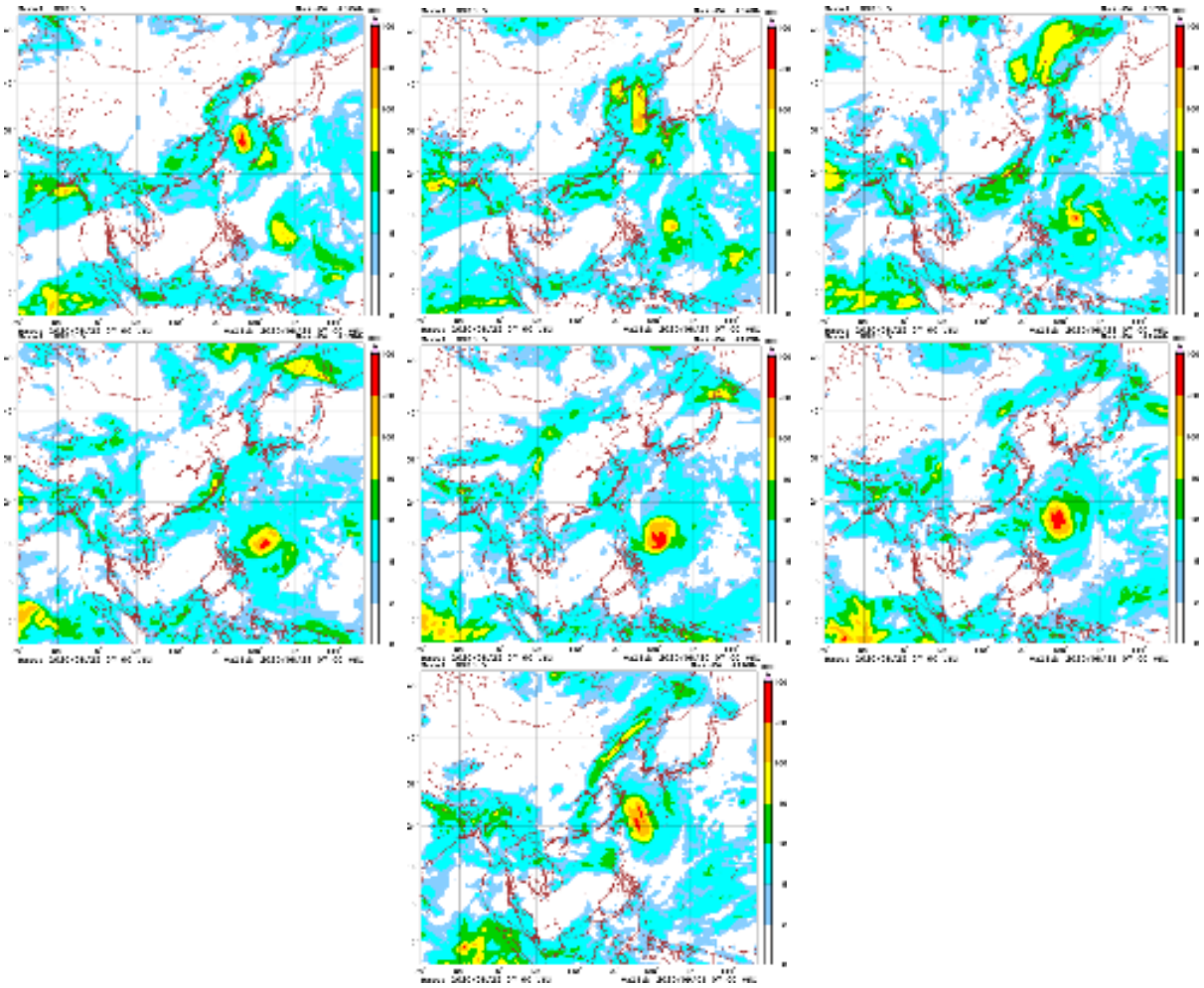


Figure 13. Accumulate rainfall forecast (24hrs) of model GFS

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on the daily flood bulletin on 24 August, daily forecast water levels along the LMB at Chiang Saen are expected to increase slightly from 4.30 – 4.50 metres in the next five days.

For Luang Prabang, the water levels will decrease from about 11.20 – 11.00 metres during the same period.

Despite this rise and fall, water levels at these stations will still be lower than their LTA, the situation has been persisting throughout this year.

Chiang Khan, Vientiane-Nong Khai and Paksane

The water levels at Vientiane station are forecasted to go down from 8.27 to 8.04 metres, while at Paksane the water levels will also decrease from 11.12 to 11 metres in the next five days. The levels will still put these stations below their LTA.

Nakhon Phanom to Pakse

Water levels at these stations are likely to increase by about 0.30 metres in the next three days. The water levels at Pakse station are forecasted to increase from 7.48 to 7.78 metres in the next five days, raising towards their LTA.

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

From Stung Treng to Neak Luong along the Mekong River, water levels will fluctuate between -0.04 and 0.12 metres in the next five days.

Water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port will fluctuate between -0.04 and 0.11 metres over the next five days. Water levels at Phnom Penh at Chaktomuk and Koh Khel on the Bassac River will also fluctuate, varying from -0.03 to 0.10 metres during the same period.

The water levels at these stations will continue staying below their LTA.

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 moving up and down below their LTAs, following daily tidal effects from the sea.

Table 2 shows the River Flood Forecasting Bulletin issued on 24 August. Results of the daily flood forecasting bulletin are also available at http://ffw.mrcmekong.org/bulletin_wet.php.

The performance of the weekly flood forecast, with an accuracy and data input evaluation from 17 to 24 August is presented in Annex 1.

6.3 Flash Flood Information

The heavy rainfall that has occurred since 10 August 2020 has given potential moisture to the dry soil in many parts of the LMB. The soil moisture has been intensifying and reaching its saturation threshold. For instance, the driest areas which found in Savannakhet, Saravane and Ubon Rachathani are likely to become wetter or less severe.

In the coming week, although in general the amount of expected rainfall for the LMB is not much, with the current soil moisture, it is likely that flash floods will still be possible at any time when there is heavy rain in locally mountainous areas.

6.4 Drought forecast

There are several climate prediction models with different scenarios on the upcoming months until December 2020. The MRC's Drought Forecasting and Early Warning System (DFEWS) adopts an ensemble model, which averages all scenarios called the North America Multi-Model Ensemble (NMME). The system is updating the data resolution from 25 km to 5 km and is expected to be ready by the end of September for the MRC DFEWS.

Temporarily, the global scale of rainfall prediction is used to see how the rain distribution looks like for the coming months. Figure 14 of the monthly anomaly maps shows daily average of each month in mm/day from August to December 2020 produced by the NMME.

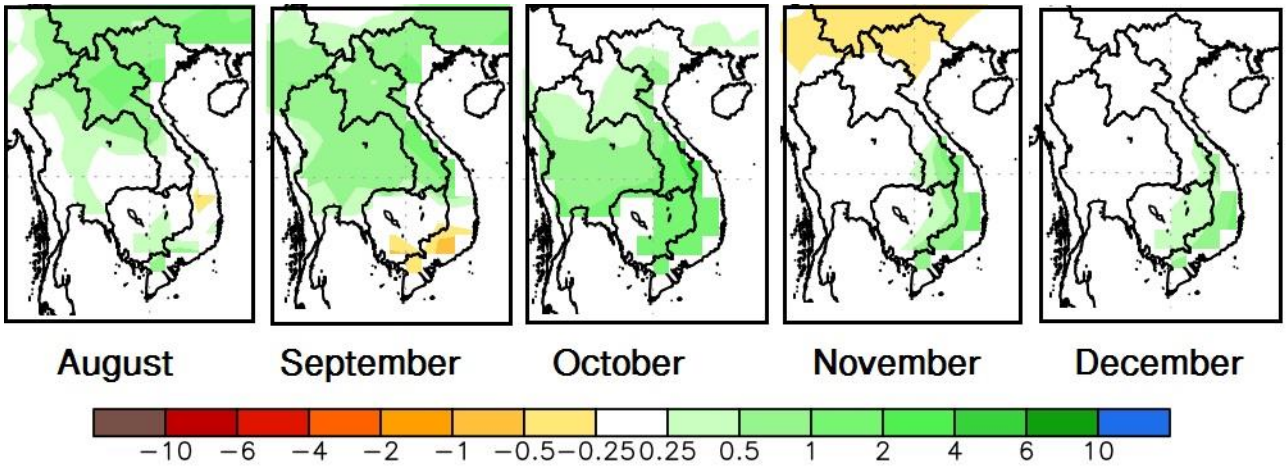


Figure 14. Daily average monthly rainfall forecast from August to December 2020

From the ensemble prediction model, the LMB is likely to receive more rain starting from this August until the end of the rainy season in November 2020. Among the upcoming five months, September is likely to receive the least rain especially in southern part of the LMB covering south of Cambodia and the Mekong Delta as well as the Central Highland of Viet Nam. October is predicted to be relatively wet while November to receive average rainfall in Thailand and Lao PDR, and an excessive amount of rainfall in southeast of the LMB.

Table 3. River Flood Forecasting 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: 25 - 29 August 2020

Date: 24 August 2020

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					
		23-Aug				23-Aug	24-Aug	25-Aug	26-Aug	27-Aug	28-Aug	29-Aug	24	25	26	27	28	29
Jinghong		0.0				535.55	535.54							×	×	×	×	×
Chiang Saen		37.0	357.110	12.80	11.50	4.55	4.17	4.33	4.37	4.40			↓	↑			★	★
Luang Prabang		21.2	267.195	18.00	17.50	11.50	11.36	11.20	11.15	11.10	11.04	11.00	↓	↓				
Chiang Khan		2.0	194.118	16.00	14.50	10.70	10.56	10.46	10.35	10.30			↓		↓		★	★
Vientiane		32.7	158.040	12.50	11.50	8.75	8.33	8.27	8.20	8.10	8.04	8.10	↓					
Nongkhai		37.2	153.648	12.20	11.40	9.20	8.84	8.79	8.73	8.65			↓				★	★
Paksane		89.8	142.125	14.50	13.50	10.11	10.66	11.12	11.08	11.05	11.00	10.96	↑	↑				
Nakhon Phanom		3.5	130.961	12.00	11.50	9.01	9.14	9.42	9.61	9.58			↑	↑	↑		★	★
Thakhek		1.8	129.629	14.00	13.00	10.11	10.25	10.55	10.76	10.72	10.68	10.63	↑	↑	↑			
Mukdahan		12.6	124.219	12.50	12.00	8.61	8.70	8.78	8.93	9.03					↑		★	★
Savannakhet		7.8	125.410	13.00	12.00	7.20	7.31	7.37	7.50	7.58	7.57	7.55	↑		↑			
Khong Chiam		0.0	89.030	14.50	13.50	9.35	9.47	9.65	9.76	9.98			↑	↑	↑	↑	★	★
Pakse		0.0	86.490	12.00	11.00	7.58	7.52	7.48	7.56	7.70	7.81	7.78	↓		↑	↑	↑	
Stung Treng		0.0	36.790	12.00	10.70	7.01	7.03	7.00	6.97	7.04	7.16	7.25				↑	↑	↑
Kratie		0.0	-0.101	23.00	22.00	15.64	15.74	15.78	15.74	15.70	15.80	15.93	↑	↑	↓	↓	↑	↑
Kompong Cham		0.0	-0.930	16.20	15.20	9.58	9.71	9.81	9.87	9.81	9.75	9.87	↑	↑	↑	↓	↓	↑
Phnom Penh (Bassac)		27.8	-1.020	12.00	10.50	5.35	5.60	5.70	5.76	5.73	5.70	5.76	↑	↑	↑	↓	↓	↑
Phnom Penh Port		nr	0.070	11.00	9.50	4.37	4.63	4.75	4.83	4.80	4.77	4.84	↑	↑	↑	↓	↓	↑
Koh Khel		0.0	-1.000	7.90	7.40	4.91	5.03	5.13	5.20	5.17	5.14	5.19	↑	↑	↑	↓	↓	↑
Neak Luong		0.0	-0.330	8.00	7.50	3.85	3.95	4.02	4.08	4.12	4.09	4.06	↑	↑	↑	↑	↓	↓
Prek Kdam		0.0	0.080	10.00	9.50	4.28	4.42	4.53	4.61	4.57	4.54	4.61	↑	↑	↑	↓	↓	↑
Tan Chau		0.0	0.000	4.50	3.50	1.16	1.26	1.36	1.45	1.58	1.78	1.99	↑	↑	↑	↑	↑	↑
Chau Doc		nr	0.000	4.00	3.00	0.94	1.05	1.18	1.30	1.45	1.66	1.89	↑	↑	↑	↑	↑	↑

REMARKS:

-: not available.

nr: no rain.

LEGEND	
rising water level	↑
stable water level	
falling water level	↓
alarm stage	
alarm situation	
flood stage	
no data available	×
as suggested by Thailand, forecasted values are not displayed pending further improvement of the system	★

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

River Flood Forecaster

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

Rainfall during this reporting week was considered above average, varying from 2.4 mm to 389 mm at different stations along the LMB from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam. The highest concentration was in the middle part of the LMB at Paksane area (up to 389 mm), very much like last week. But the rainfall amount during this reporting week was lower than that of last week (50 – 450 mm).

Neither tropical depressions nor tropical storms in the LMB were detected during this reporting week in the LMB. On 23 August, there were two lines of low pressure of the Monsoon Trough, crossing the northern and eastern parts of the Mekong region. This situation may bring some rainfall to these areas over the next few days.

Based on forecast rainfall from satellite using GFAS data, it shows that rain will take place in areas between Lao PDR's Luang Prabang and Thailand's Nakhon Phanom, varying from 50 mm to 100 mm in the next five days. This will increase the chance of moderate rainfall concentration over the LMB in the upcoming week.

7.2 Water level and its forecast

Water levels at several locations in the LMB during this reporting week increased due to heavy rain in the middle part of the LMB, which added up about 0.65 metres in stations between Vientiane and Paksane. The levels at most of these monitoring stations were lying close to their long-term averages (LTA).

In general, this week's water levels at most of the stations were another level higher than those of last week, except at the portions from Chaktomuk to Koh Khel on the Bassac River, and from Phnom Penh Port to Prek Kdam on the Tonle Sap River in Cambodia where the levels this week were decreasing – very much similar to the figure recorded last year.

The starting date of the reverse flow from the Mekong River into the Tonle Sap Lake took place on August 4, a bit late compared to a normal event. However, two extremely small and brief instances happened in July. Due to late reverse flows this year, the water volume of the Lake at this reporting point remains extremely small and less than its minimum volume (even than the 2019's) and is considered at critical level.

Over the next few days, water levels across all the stations in the LMB are expected to fluctuate between -0.05 and 0.45 metres. All stations' water levels are expected to remain somewhere below their LTAs, however.

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

Such moderately added precipitation and higher water levels will be a driving factor to bring water levels at most of the stations along the Mekong mainstream, which were recorded critically low during the past months, up to a certain level in the following weeks.

Since the beginning of this year (2020), water levels in the Lower Mekong River have been lower than their LTAs for all monitoring stations (from upper to lower stretches within the LMB). Like many parts of the world, the Mekong region has been affected by the prolonged El Nino event, the phenomenon that usually causes extreme heat and insufficient rainfall. This climate change impact has been observed since 2019. Therefore, the main cause of low water levels in the Mekong mainstream from June to July 2020 could be the unusual low rainfall as results of the climate change affecting the Lower Mekong Region.

For a more complete preliminary analysis of the hydrological conditions in the LMB over January – July 2020, please refer to this Situation Report.

The contribution to the Mekong River's flow from the Upper Mekong Basin 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 rainfall forecasted to be small and moderate, flash flood events may not be possible over the LMB in the next reporting period, and if happening they could only be minor.

However, local heavy rain can still happen at any time, leading to potential flash flood occurrences, especially at high mountainous areas.

7.4 Drought condition and its forecast

Drought condition of the LMB from 13-19 August was getting much better compared to the condition over past weeks. Severe and moderate drought conditions appeared in Quang Tri of Viet Nam which shares the territory with the LMB, northern and eastern Ubon Ratchathani of Thailand, Chamapasak of Lao PDR, central part of Nakhon Phanom and Chiang Rai of Thailand, and Luangamtha of Lao PDR. However, the situation is not significant.

The upcoming three-month (September-November) forecast show that LMB areas are likely to receive more rain compared to the previous months and its three-month long-term average. However, the southern part of the LMB including south of Cambodia, Mekong Delta, as well as Central Highland of Viet Nam are predicted to receive less rain than other areas in September 2020.

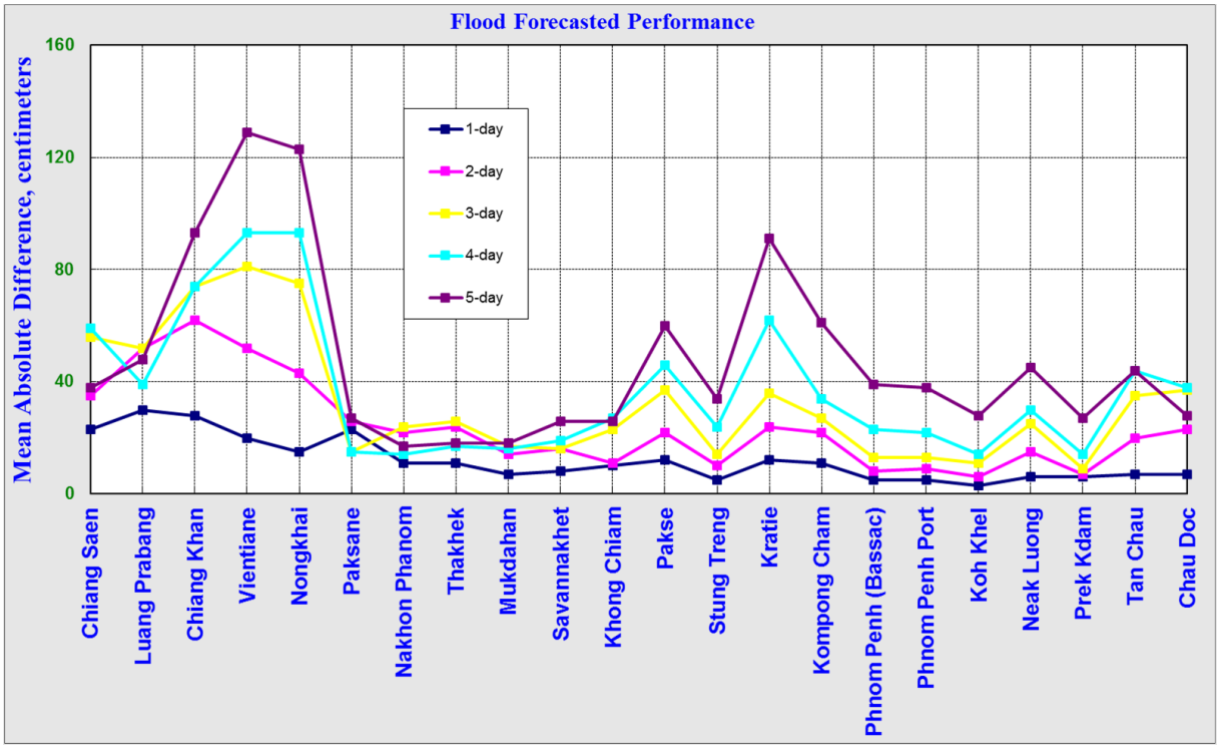
Annex 1: Performance of the weekly flood forecasting

Accuracy

"Accuracy" here refers to the state where data recorded in the MRC's Mekong River Flood Forecasting System are cleaned and verified to ensure they are correct before releasing.

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 18 to 24 August 2020.

The forecasting values from 18 to 24 August 2020 show that the overall accuracy is fair for 1-day to 3-day forecast lead time at stations in the middle part of the Mekong River from Luang Prabang to Vientiane due to the hydropower operation and heavy rainfall affecting this area.



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

- Missing data and data input are not sufficient to be used for inputting into the flood forecasting model system.
- The influence of heavy rainfall and hydropower operations from upstream (Xayaburi) and tributaries inflows.

- Luang Prabang, Chiang Khan and Paksane 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 rapid high-water levels.
- Rapid fluctuations of 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 for a successful lead-time 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 24 August 2020.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 17 – 24 Aug 2020 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	23	30	28	20	15	23	11	11	7	8	10	12	5	12	11	5	5	3	6	6	7	7
2-day	35	52	62	52	43	26	22	24	14	16	11	22	10	24	22	8	9	6	15	7	20	23
3-day	56	52	74	81	75	15	24	26	17	16	23	37	14	36	27	13	13	11	25	9	35	37
4-day	59	39	74	93	93	15	14	17	16	19	27	46	24	62	34	23	22	14	30	14	44	38
5-day	38	48	93	129	123	27	17	18	18	26	26	60	34	91	61	39	38	28	45	27	44	28

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 17 – 24 Aug 2020 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	71.4	57.1	71.4	42.9	85.7	85.7	57.1	57.1	42.9	71.4	71.4	57.1	42.9	71.4	42.9	71.4	57.1	57.1	57.1	57.1	***61.7***
2-day	50.0	83.3	33.3	66.7	50.0	66.7	66.7	66.7	66.7	66.7	50.0	66.7	66.7	33.3	50.0	66.7	66.7	50.0	50.0	50.0	50.0	66.7	***58.3***
3-day	60.0	80.0	60.0	80.0	80.0	20.0	80.0	80.0	80.0	80.0	100.0	80.0	100.0	80.0	60.0	60.0	60.0	80.0	80.0	60.0	80.0	80.0	***73.6***
4-day	50.0	75.0	25.0	50.0	50.0	25.0	25.0	25.0	75.0	100.0	100.0	75.0	100.0	75.0	50.0	100.0	100.0	75.0	50.0	75.0	50.0	50.0	***63.6***
5-day	0.0	66.7	66.7	66.7	66.7	100.0	100.0	33.3	100.0	100.0	100.0	100.0	66.7	100.0	66.7	100.0	100.0	100.0	66.7	100.0	33.3	66.7	***77.3***

Note: Red values are not well matched with the actual values in (%) and (cm)

Table B3: Overview of performance indicators for the past 8 days from 17 to 24 August 2020

	FF time sent				Arrival time of input data								Missing data (number-mainstream and trib.st.)							
2020	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
week	*10:20*	*00:00*	-	-	*08:15*	*07:10*	*07:03*	*07:46*	*08:38*	*08:29*	*07:01*	*08:24*	*0*	*0*	*3*	*0*	*74*	*0*	*0*	*0*
month	*10:24*	*00:00*	-	-	*08:15*	*07:10*	*07:38*	*08:11*	*08:39*	*08:26*	*07:14*	*08:25*	*0*	*0*	*37*	*0*	*464*	*0*	*2*	*38*

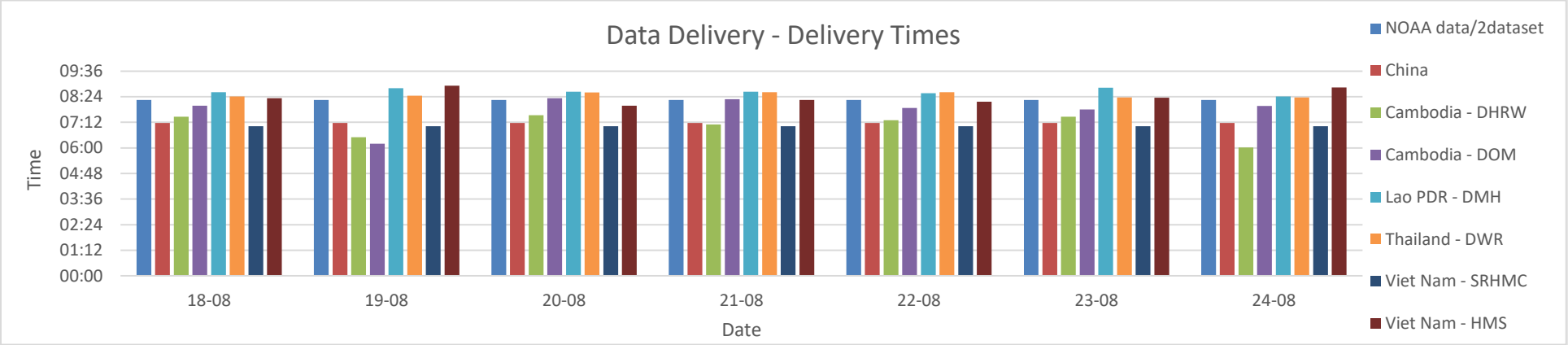


Fig. B4: Data delivery times for the past 8 days from 17 to 24 August 2020

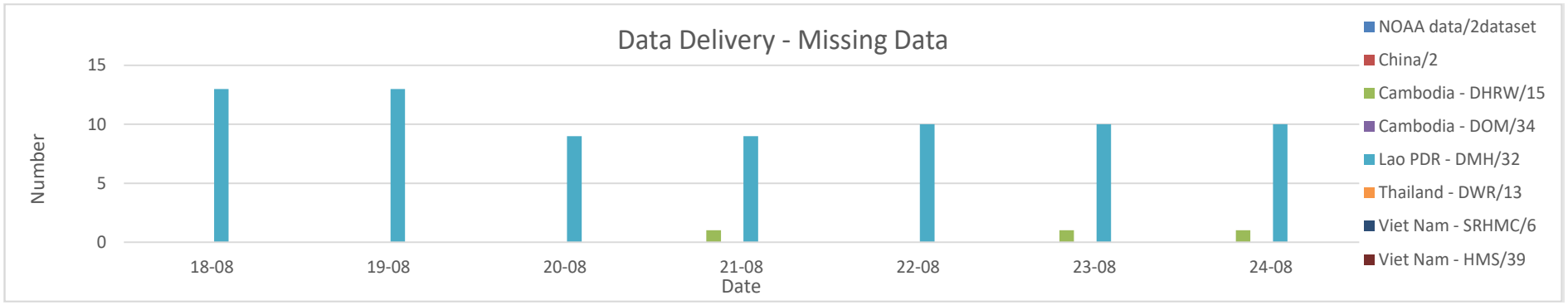


Fig. B5: Missing data for the past 7 days from 17 to 24 August 2020

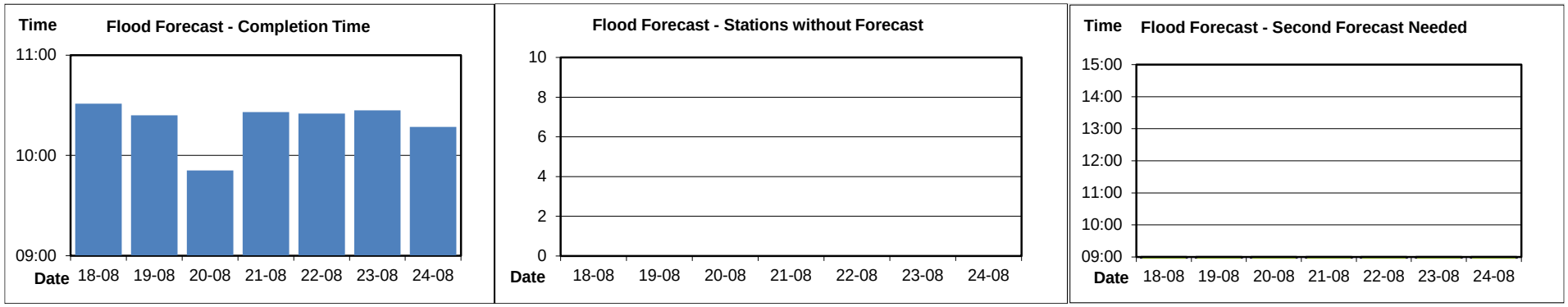


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 17 to 24August 2020

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