Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin

1 – 7 September 2020

Prepared by
The Regional Flood and Drought Management Centre
8 September 2020

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Mekong River Commission
Documentation and Learning Centre
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Telephone: +856-21 263 263 | E-mail: mrcs@mrcmekong.org | www.mrcmekong.org

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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 **01 -07 September 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 (September, October and November) and the weather maps issued by the Thailand Meteorology Department (TMD) were used to verify weather conditions in the LMB.

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

Figure 1 presents the weather map of 7 September 2020, showing two lines of any low pressure of the Monsoon Trough crossing the Mekong region which can bring some rainfall over the next few days.

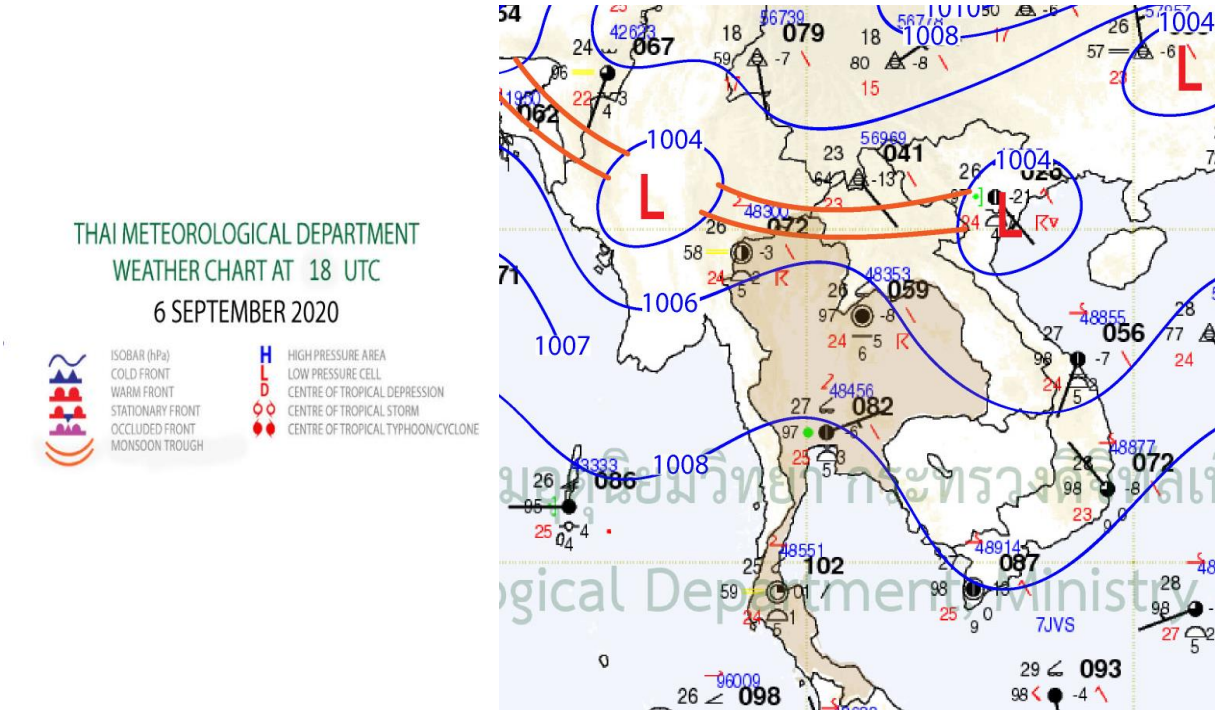


Figure 1. Summary of weather conditions over the LMB

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

Subsequently, from September to October, 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 September, October and November 2020 in Southeast Asia based on results from the NCEP model (National Centres for Environmental Prediction).

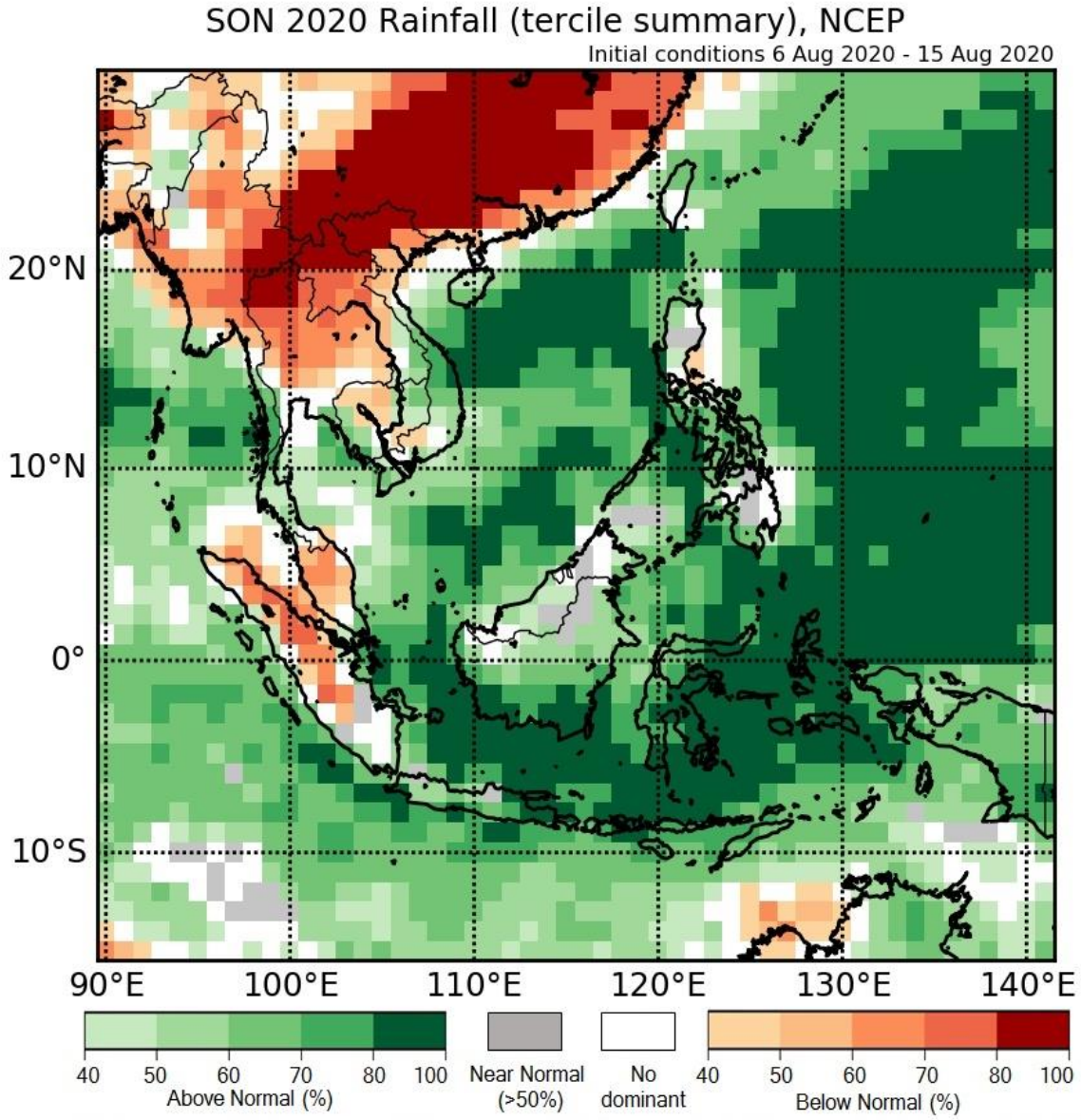


Figure 2. Predicted rainfall over Asian Countries by ASMC

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 below average, varying from 4 mm to 162 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 lower part of the LMB from Cambodia's Kratie to Tan Chau and Chau Doc area (ranging from 28 mm to 162 mm), much smaller at the middle part of Mekong region compared to last week's. The total weekly observed rainfall at these selected stations is shown in Figure 3.

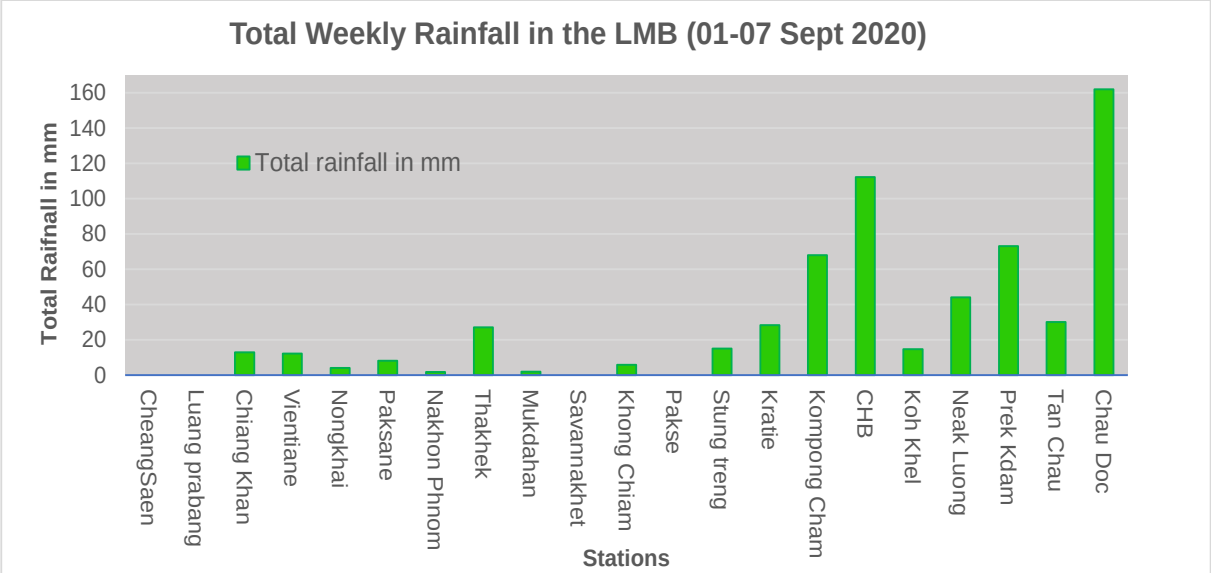


Figure 3. The weekly total rainfall over the LMB

To verify area rainfall distribution, Figure 4 shows a map of the weekly accumulated rainfall based on observed data provided by the MRC Member Countries – Cambodia, Lao PDR, Thailand and Viet Nam – from 1 to 7 September.

The situation during this reporting week is comparable to that of last week, except that the amount of rainfall this week (4 – 162 mm) was considered higher than average at the lower part of the basin from Kratie to Tan Chau and Chau Doc, but lower than average at the middle part from Chiang Saen of Thailand to Pakse of Lao PDR.

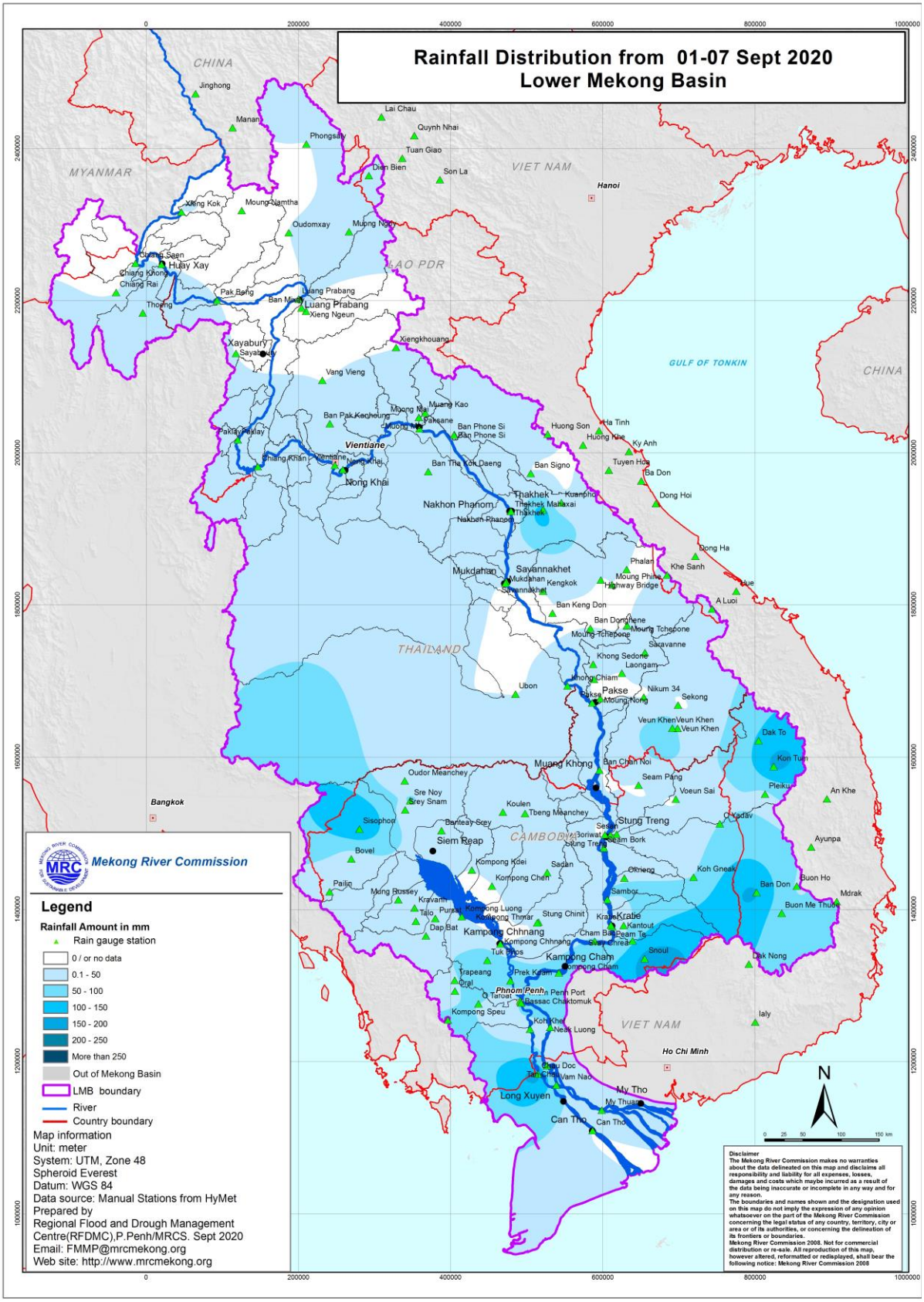


Figure 4. The weekly rainfall distribution over the LMB

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.

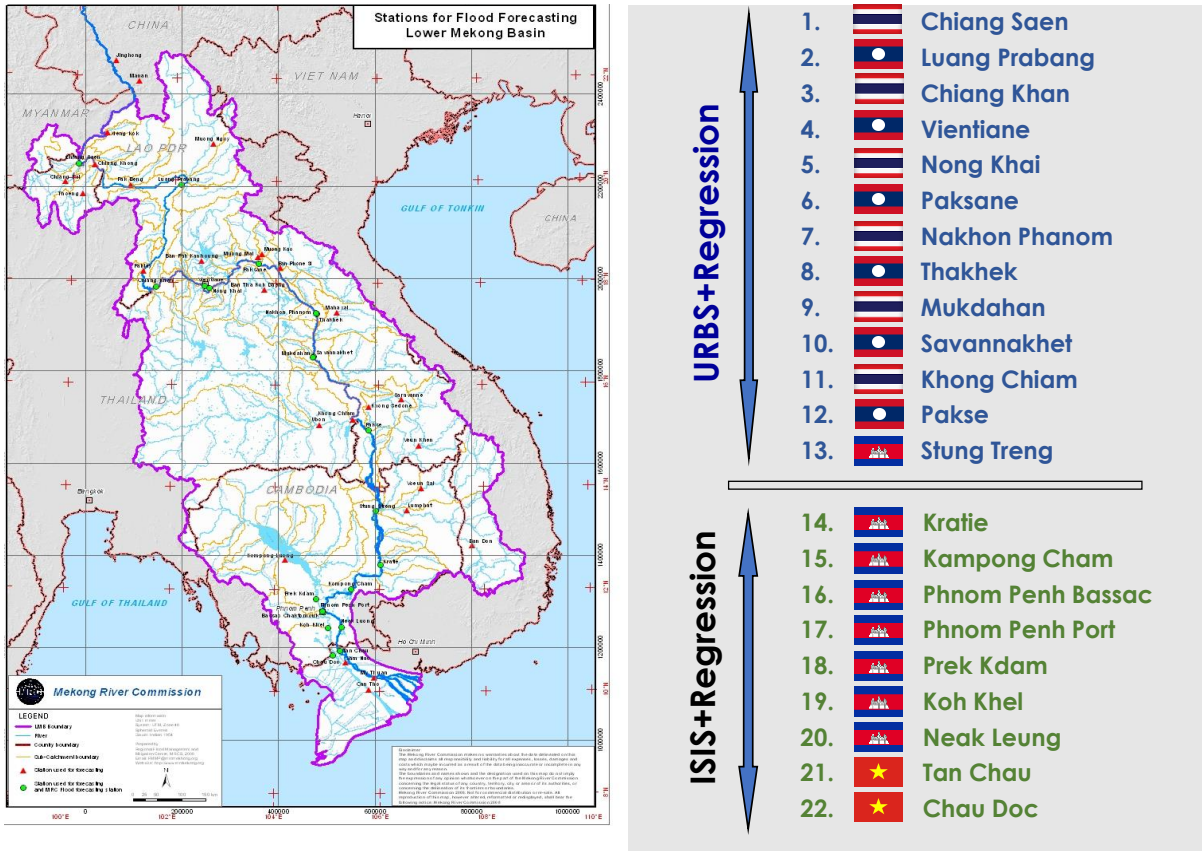


Figure 5. Key stations and model application for River Monitoring and Flood Forecasting

Chiang Saen and Luang Prabang

Water level during September 1-7 at Chiang Saen station in Thailand was decreasing from 3.80 to 2.86 meters during this reporting week. The main 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 comparing to last week, this week's water levels are relatively lower.

Water level at Luang Prabang monitoring station in Lao PDR slightly increased from 10.05 meters to 10.13 meters during the reporting period. Compared to last week, the figure shows a decreasing number, ranging from -0.07 to 0.07 metres. However, this level is higher than that of 2019 and remains lower than its long-term average (LTA).

Being situated 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 its 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 level at Chiang Khan decreased from 8.50 metres last week to 7.56 metres this week, standing 3.97 metres lower than its LTA value. The level is at a minimum one and is as low as the record in 2019. Operation of the Xayaburi dam upstream is believed to be the main cause of the issue.

Downstream water levels from Vientiane to Paksane followed the same direction of the Chiang Khan's one. The decrease varied between -0.44 and -0.03 metres. Less water contribution from upstream inflows and sub-catchments is likely the main reason. **Compared to this time last year, water levels at these stations are slightly higher, except that at Paksane, whose water level dropped 2.15 metres below its minimum level to a very critical condition**.

Nakhon Phanom to Pakse

Similarly, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR were decreasing during the reporting period, ranging between -0.67 and -0.12 metres. Low rainfall in upstream and its adjacent catchments is likely the cause of these decreasing water levels. Figure 6 shows that the water levels at these two stations dropped 1.5 meters below the LTAs. **During this week, water levels at the two stations are even lower than their historical minimum values and are considered critical.**

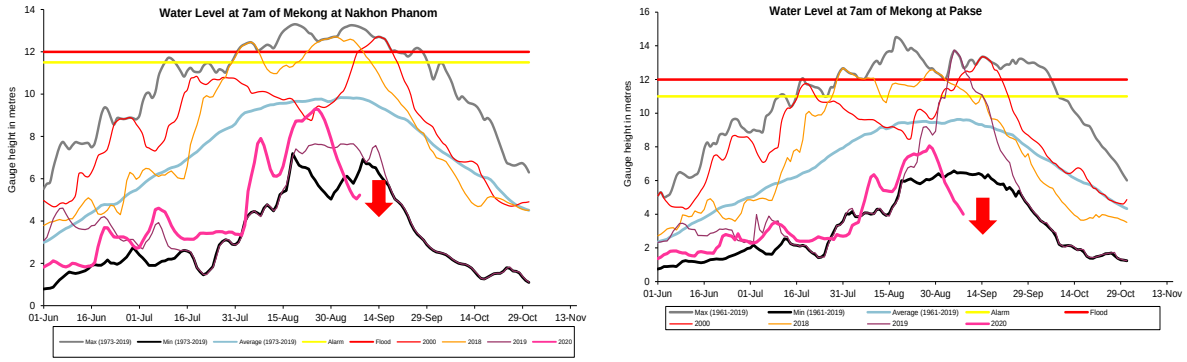


Figure 6. Water levels at Nakhon Phanom of Thailand and Pakse of Lao PDR

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 drastically decreasing, dropping more than 1 meter below their historical minimum levels. **This week's water levels are considered critical** (see Figure 7).

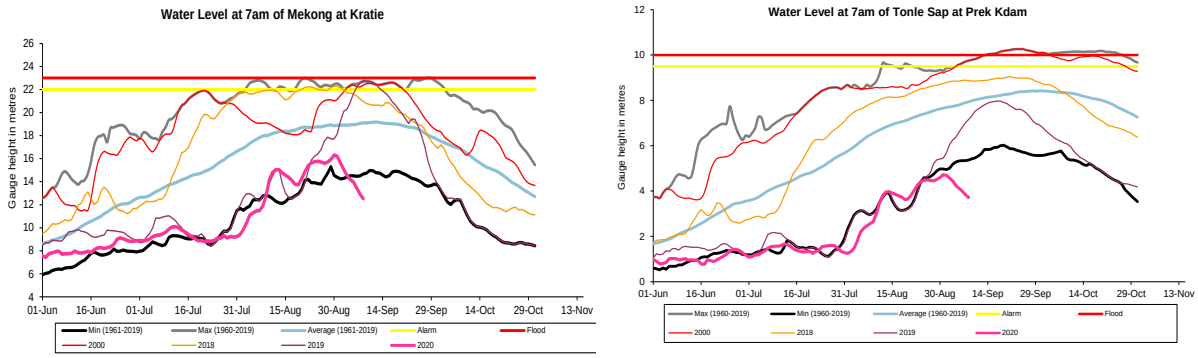


Figure 7. Water levels at Kratie on Mekong River and Prek Kdam on Tonle Sap River

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 and minimum level due to daily tidal effects from the sea. **The figures are considered as critical condition**.

The Tonle Sap Flow

At the end of the dry season, when water levels along the Mekong River increase, flows of the Mekong River reverse into the Tonle Sap Lake (TSL). This phenomenon normally takes place from mid-May to mid-October.

Figure 8 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 September 7 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 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, water volume of the Lake up to this point has been considered critical as it is still lower than its minimum level. Figure 9 shows seasonal changes in monthly flow volume up to September 7 for the TSL compared with the volumes in 2018 and 2019 and their LTA and the fluctuating levels (1997-2019). It shows that in July, August, and early September water volume of the Lake was **at a very 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 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.

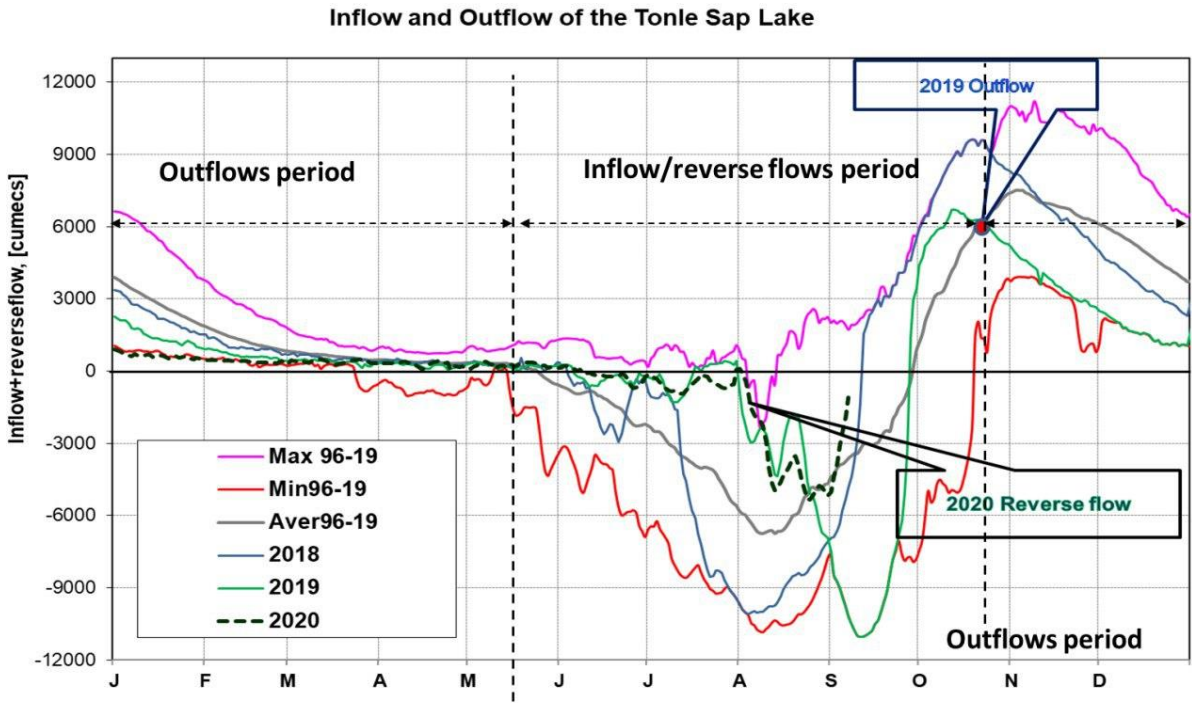


Figure 8. The seasonal change of inflows and outflows of Tonle Sap Lake

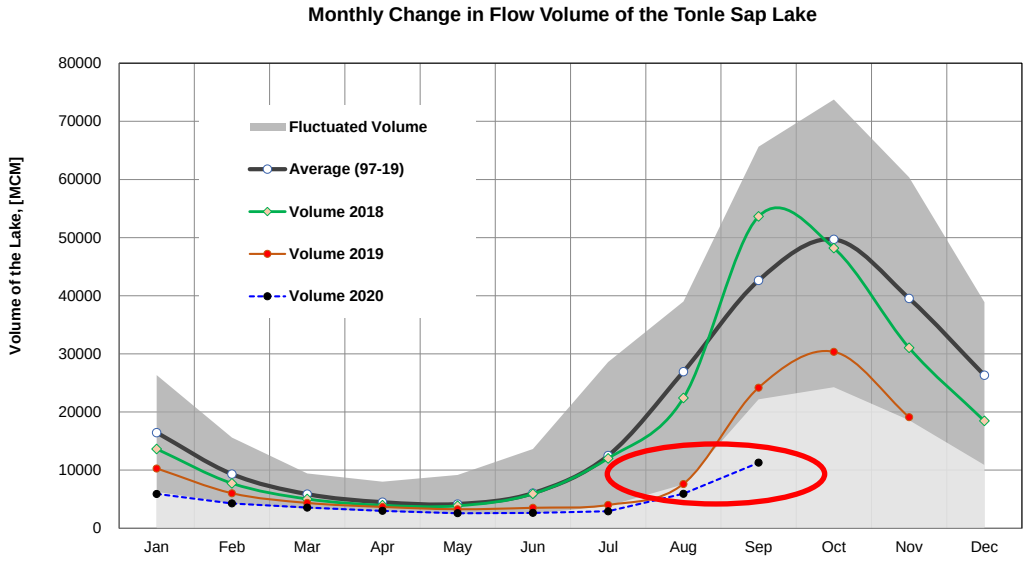


Figure 9. The seasonal change in monthly flow volume of Tonle Sap Lake

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]	Percentage of Volume in 2020 [%]
Jan	16452.95	26357.53	6272.01	13633.41	10285.31	5906.80	35.90
Feb	9312.36	15596.22	4281.41	7729.72	6019.30	4264.19	45.79
Mar	5868.92	9438.24	3350.92	5037.06	4354.62	3553.99	60.56
Apr	4474.98	8009.14	2875.42	3956.47	3667.47	2992.61	66.87
May	4166.07	9176.93	2417.81	3864.00	3266.43	2594.92	62.29
Jun	6034.10	13635.01	2470.54	5919.18	3517.06	2641.88	43.78
Jul	12502.58	28599.56	3832.51	12024.96	4001.99	2925.86	23.40
Aug	26934.35	39015.12	7554.93	22399.65	7622.71	5941.07	22.06
Sep	42644.05	65632.35	22180.73	53639.54	24194.19	11276.85	
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 September 1-7, most areas in the LMB received small or moderate amount of daily rainfall, leading to dry and near-normal condition of Average Soil Moisture (ASM). Therefore, flash floods during this period did not occur.

Figure 10 shows the Flash Flood Guidance (FFG) results for 3 and 6 hours and the ASM produced by the MRC's Flash Flood Guidance System (MRC-FFGS) on September 6 at 00:00 UTC (07:00 AM local time).

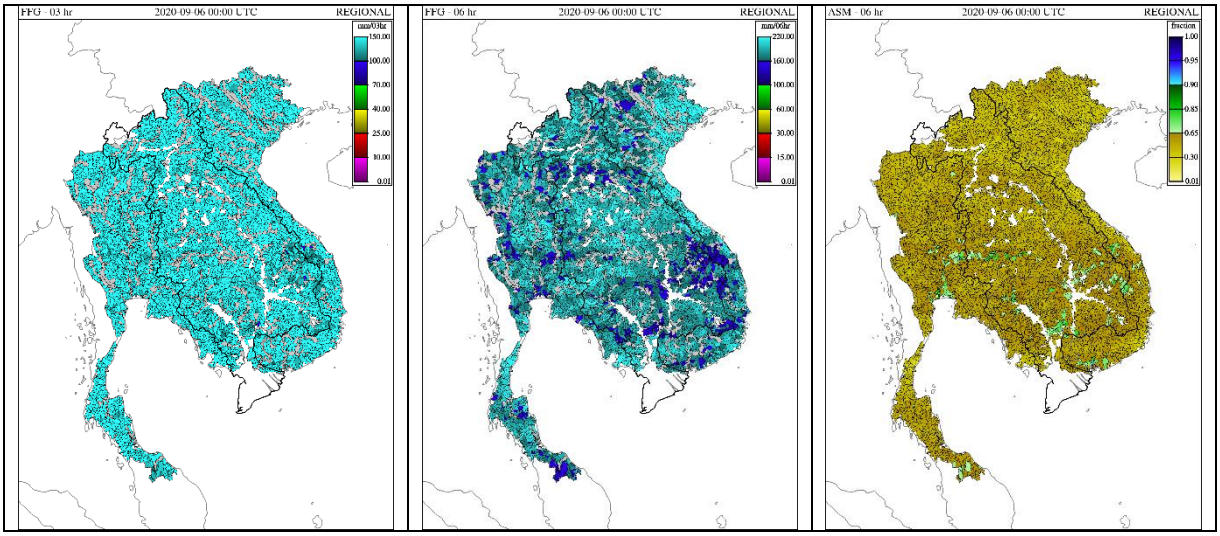


Figure 10. Flash Flood Guidance (FFG) for the next 3 and 6 hours and Average Soil Moiture (ASM) 6 hours produced on Sep 6 at 00:00 UTC

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from August 27 to September 2

Drought monitoring data are available from Thursday to Wednesday every week; thus, the reporting period is normally delayed for one week compared to Flood and Flash Flood reports.

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

From August 27 to September 2, as shown in Figure 11, a meteorological indicator of SPI shows considerable dryness in lower part of north-eastern Thailand covering Nakhon Ratchasima, Burirum, and Surin, and the Mekong Delta of Viet Nam, covering Ca Mau, Bac Lieu, Kien Giang and Kien Giang. Some areas of Ratanakiri and Kampong Thom of Cambodia were also very dry. Moderate dry presented in Sisaket, Sarakham, Khon Kaen, Cyaiyaphum, and some parts of Sakon Nakhon and Nakhon Phanom of Thailand. Besides that, the bordering area between Luang Prabang, Vientiane, and Xieng Khuang of Lao PDR were also at moderate dry during the monitoring period.

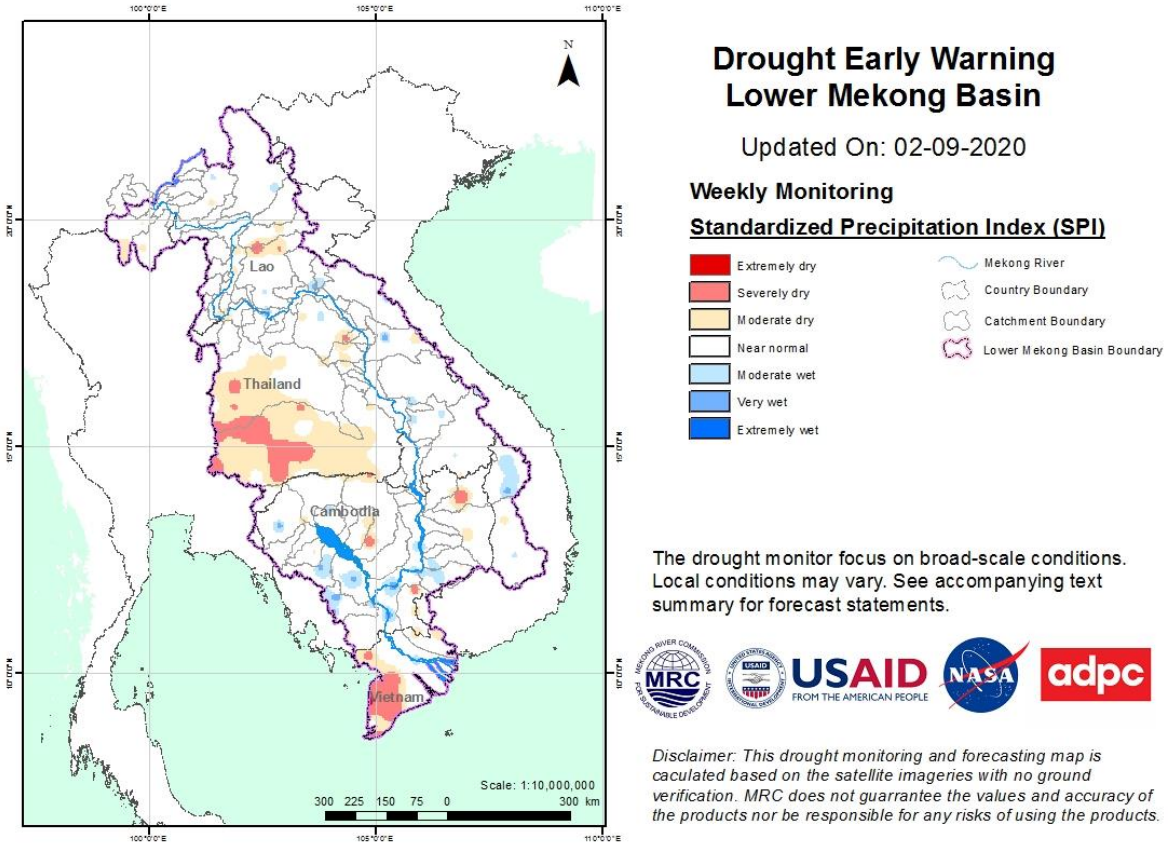


Figure 11. Weekly standardised precipitation index from Aug 27 to Sep 2

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

The agricultural indicator through soil moisture anomaly index does not change much from the previous week (August 20-26). As shown in Figure 12, the driest soil moisture condition is found in northern LMB including Chiang Mai, Chiang Rai, Xayaburi, Luang Prabang and Oudomxay, ranging from moderate to extreme dry. North-west of Loei in Thailand, east of Savanakhet in Lao PDR and west of Quang Tri in Viet Nam were also severely dry from August 27 to September 2.

Coincidently, moderate dry was found in northern, middle, and eastern LMB areas including Lao PDR's Bokeo, Luang Namtha, Oudomxay, Phongsaly, and Xieng Khuang; Thailand's Sisaket and Ubon Rachathani; and Viet Nam's Dak Lak, Gia Lai, Binh Dinh and Kon Tum. None of soil moisture indicator in Cambodia was dry during the abovementioned period.

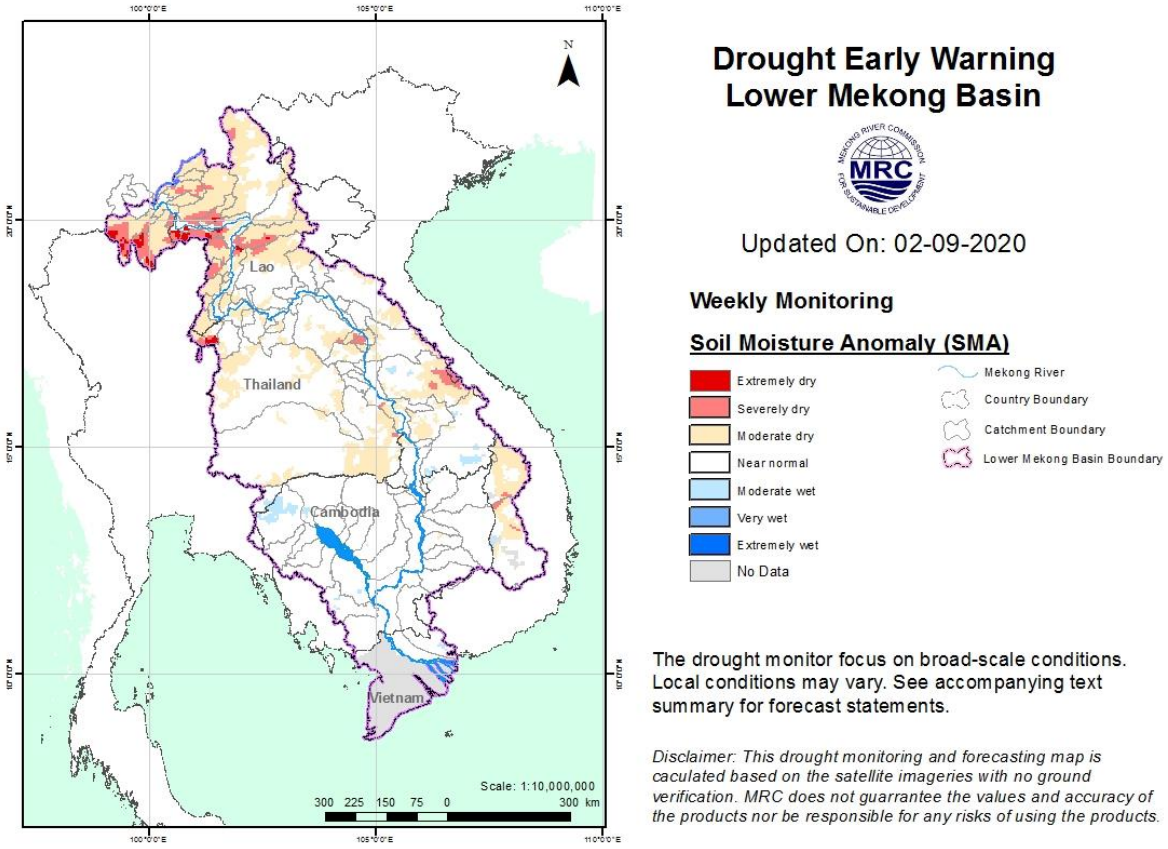


Figure 12. Weekly Soil Moisture Anomaly from Aug 27 to Sep 2

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

The overall drought condition through a combined drought index (CDI), as shown in Figure 13, indicates some severe dry in north of the LMB, covering west of Thailand's Chiang Mai, Chiang Rai, Phayao and Loei, and the bordering area of Lao PDR's Luang Prabang, Vientiane and Xieng Khuang. There was some moderate dry in Lao PDR's Xayaburi and Oudomxay, and Thailand's Sisaket, Sakon Nakhon and Nakhon Phanom. The CDI values show that drought condition is a bit drier in north of LMB compared to last week (August 20-26). The overall situation is not serious, however.

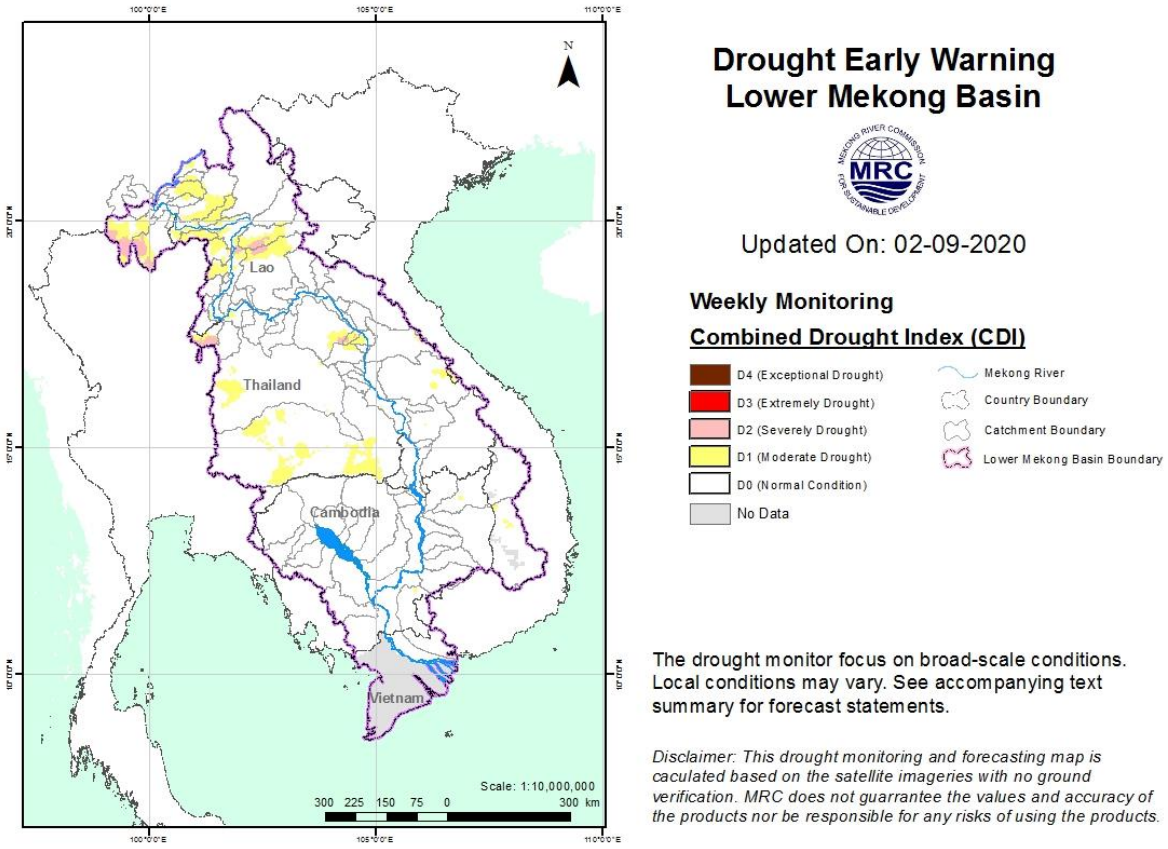


Figure 13. Weekly Combined Drought Index from Aug 27 to Sep 2

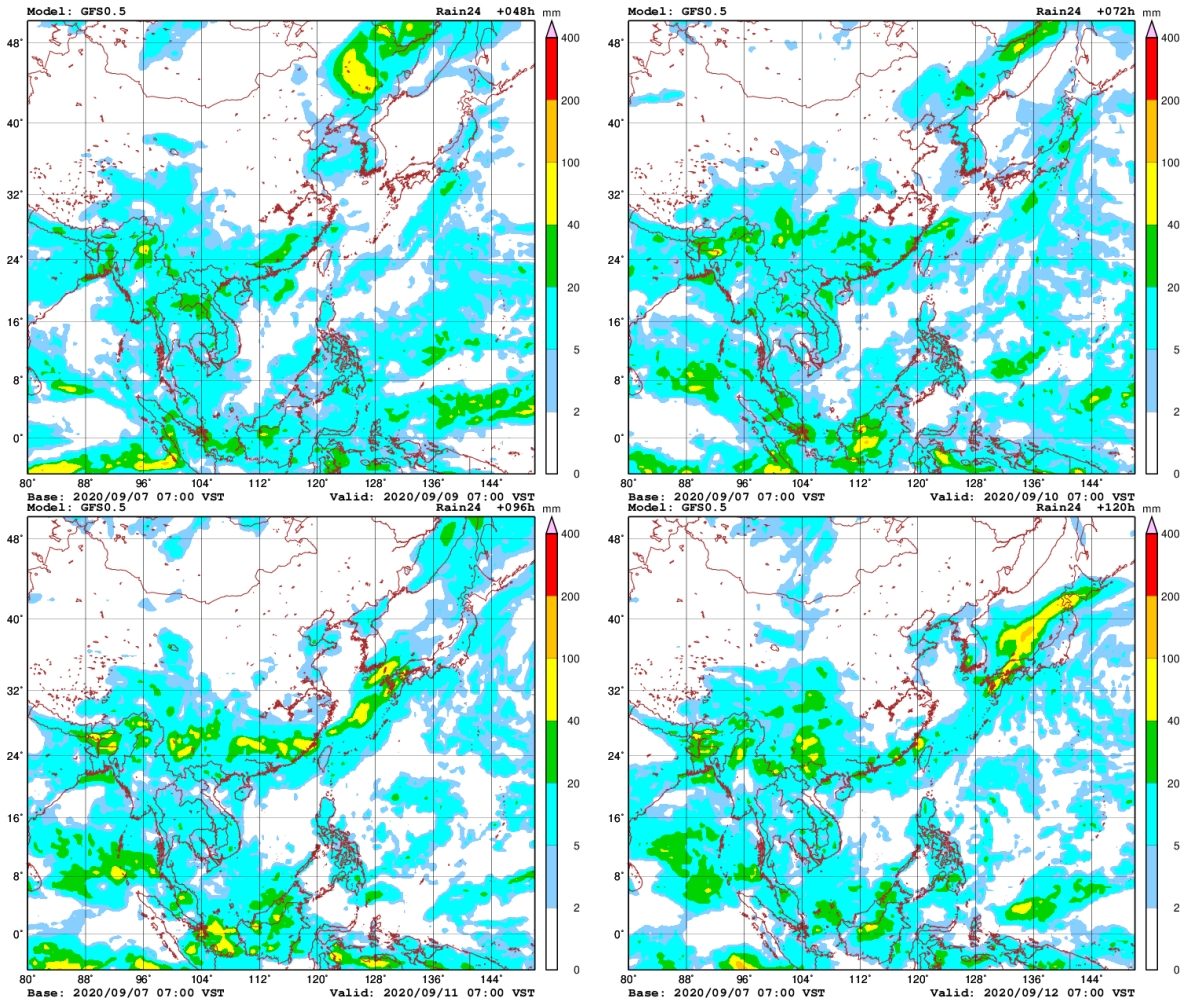
More information on Drought Early Warning and Forecasting as well as the explanation is available here: http://droughtforecast.mrcmekong.org/templates/view/our-product

6 Weather and Water Level Forecast and Flash Flood Information

6.1 Weather and rainfall forecast

Based on the analysis of synoptic meteorological, in the coming week, there might be two factors affecting the LMB region. They include (i) Intertropical Convergence Zone (ITCZ) going through the upper to the middle part, but its operation will be lower than last week; and (ii) Sub-Tropical High Pressure with a strong operator in north-central parts of Viet Nam which covers areas in Lao PDR and Cambodia. That phenomenon will bring moderate rainfall of approximately 20 – 40 mm/24hrs in the middle parts (Lao PDR) during next week.

Figure 14 shows the accumulated rainfall forecast (24hrs) of the Global Forecast System (GFS) model from September 9 through 15.



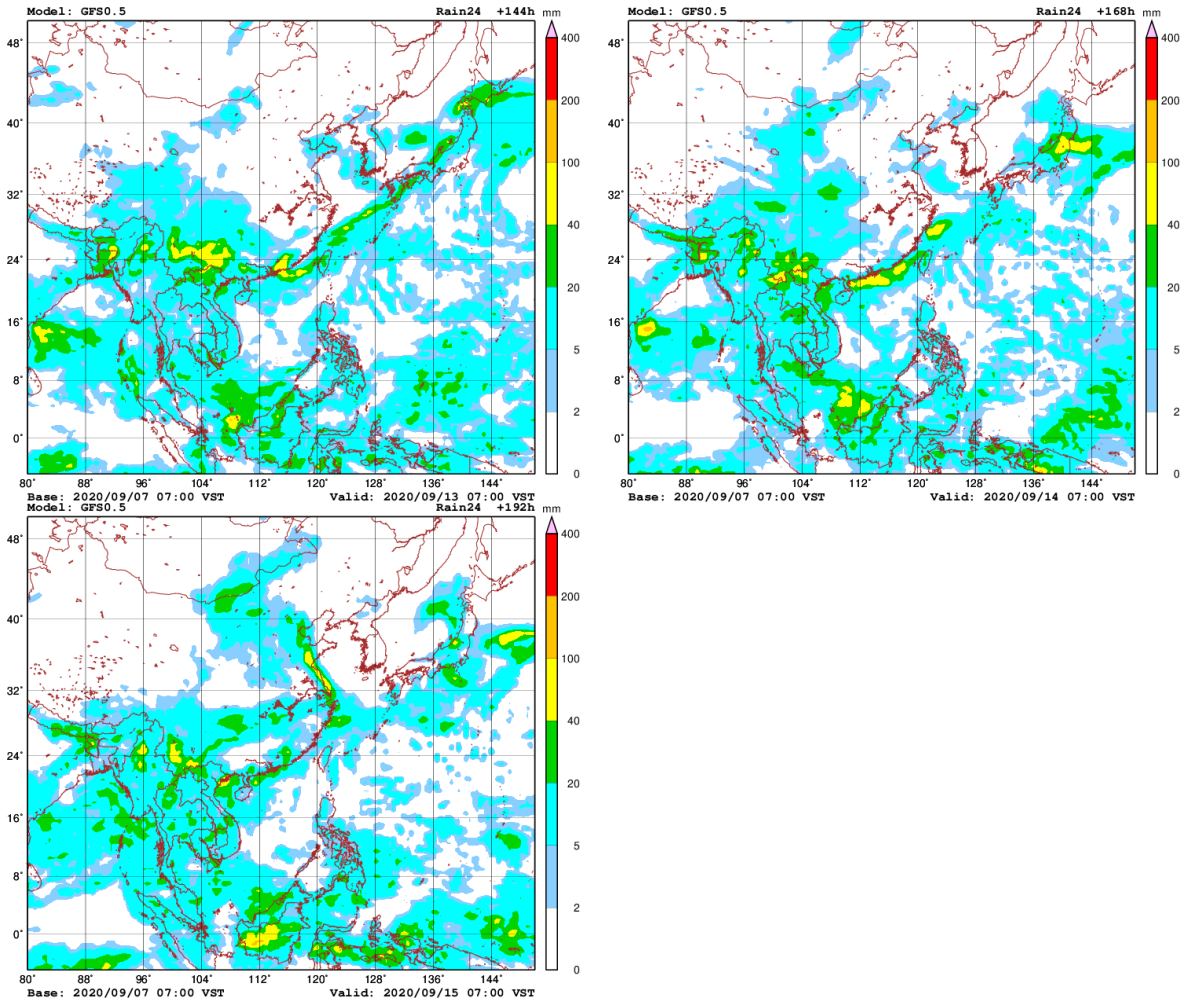


Figure 14. Accumulate rainfall forecast (24 hrs) of model GFS[1]

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on the daily flood bulletin of September 7, daily forecast water level at Chiang Saen is expected to slightly increase from 2.86 to 2.99 metres in the next five days.

For Luang Prabang, the water levels will decrease from about 10.13 to 9.86 metres during the same period.

The trend here will continue to make the water levels at these stations lower than their LTAs.

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Vientiane station is forecasted to go down from 4.65 to 4.43 metres, while at Paksane, the level will increase slightly from 6.25 to 6.56 metres in the next five days, thanks

[1] Source: https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/global-forcast-system-gfs

to the forecasted small amount of rainfall in the area. Despite that, the water levels here will still be lower than their LTAs.

Nakhon Phanom to Pakse

Water levels at these stations are also likely to increase by about 0.15 metres in the next five days.

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 decrease between -0.40 and -0.02 metres in the next five days.

Water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port will decrease between -0.17 and -0.03 metres over the next five days. Water levels at Phnom Penh, Chaktomuk, and Koh Khel on the Bassac River will fluctuate, varying from -0.18 to -0.03 metres during the same period.

The water levels at these stations will continue staying close to their LTA and minimum levels.

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, 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 September 7. 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 September 1-7 is presented in Annex 1.

6.3 Flash Flood Information

With some potential rainfall forecasted for next week, flash flood event is likely to happen in some areas in Lao PDR and Viet Nam; local heavy rains in a short period of time are also possible with unexpected flash floods in certain areas. The information on flash flood guidance for the next 1, 3, and 6 hours is updated twice daily at http://ffw.mrcmekong.org/ffg.php.

Further detailed information for Flash Flood Information Warnings, as well as the explanation, is available in excel file of the link below:
http://ffw.mrcmekong.org/ffg/folderxls/1598928638_FFGS_result.xlsx.

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 15 of the monthly anomaly maps shows daily average of each month in mm/day from August to December 2020 produced by the NMME.

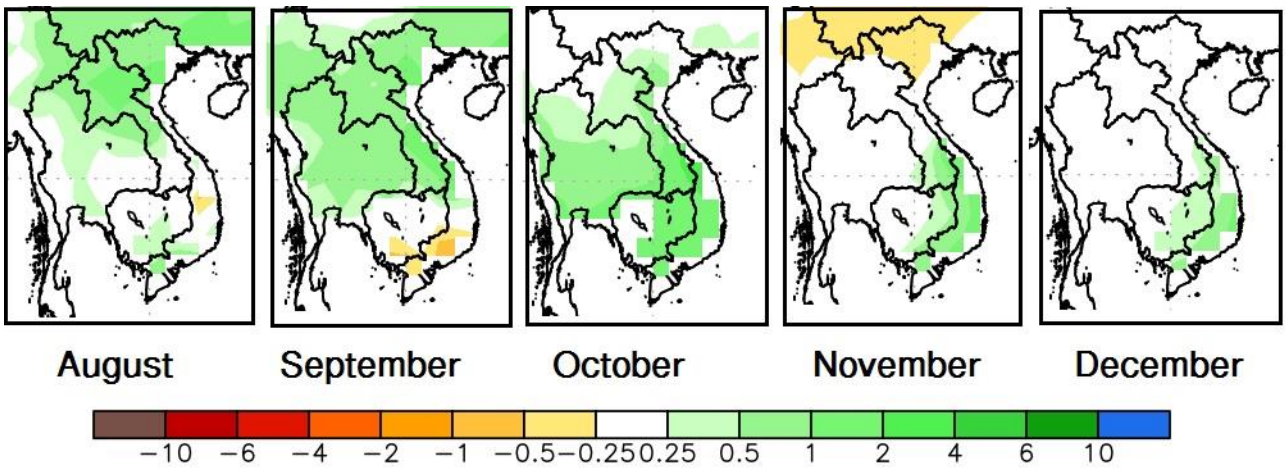


Figure 15. Daily average monthly rainfall forecast from Aug to Dec 2020

From the ensemble prediction model, the LMB is likely to receive more rain starting from 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 2. 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: 07 - 12 September 2020

Date: 07 September 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					
		06-Sep				06-Sep	07-Sep	08-Sep	09-Sep	10-Sep	11-Sep	12-Sep	07	08	09	10	11	12
Jinghong		0.0				535.67	535.65							×	×	×	×	×
Chiang Saen		0.0	357.110	12.80	11.50	2.84	2.86	2.88	2.89	2.89							★	★
Luang Prabang		0.0	267.195	18.00	17.50	10.17	10.13	10.06	10.00	9.95	9.90	9.86						
Chiang Khan		10.5	194.118	16.00	14.50	7.78	7.56	7.50	7.53	7.55			↓				★	★
Vientiane		0.0	158.040	12.50	11.50	4.70	4.65	4.42	4.36	4.38	4.40	4.43		↓				
Nongkhai		0.0	153.648	12.20	11.40	4.92	4.89	4.67	4.61	4.63				↓			★	★
Paksane		5.5	142.125	14.50	13.50	5.88	6.25	6.37	6.43	6.46	6.50	6.56	↑	↑				
Nakhon Phanom		1.1	130.961	12.00	11.50	5.17	5.05	5.18	5.23	5.26			↓	↑			★	★
Thakhek		2.3	129.629	14.00	13.00	6.38	6.24	6.39	6.45	6.50	6.53	6.58	↓	↑				
Mukdahan		0.0	124.219	12.50	12.00	5.10	4.87	4.79	4.87	4.90			↓				★	★
Savannakhet		0.0	125.410	13.00	12.00	3.70	3.45	3.38	3.44	3.46	3.48	3.49	↓					
Khong Chiam		0.0	89.030	14.50	13.50	5.97	5.68	5.38	5.27	5.38			↓	↓	↓	↑	★	★
Pakse		0.0	86.490	12.00	11.00	4.58	4.30	4.12	4.05	4.10	4.13	4.16	↓	↓	↓			
Stung Treng		0.0	36.790	12.00	10.70	5.35	5.18	4.97	4.87	4.83	4.86	4.88	↓	↓	↓			
Kratie		0.0	-0.101	23.00	22.00	13.45	12.93	12.74	12.51	12.40	12.36	12.40	↓	↓	↓	↓	↓	↑
Kompong Cham		9.0	-0.930	16.20	15.20	8.12	7.72	7.31	7.15	6.95	6.87	6.82	↓	↓	↓	↓	↓	↓
Phnom Penh (Bassac)		13.5	-1.020	12.00	10.50	4.90	4.73	4.55	4.47	4.37	4.33	4.31	↓	↓	↓	↓	↓	
Phnom Penh Port		nr	0.070	11.00	9.50	3.90	3.75	3.58	3.50	3.40	3.36	3.33	↓	↓	↓	↓	↓	↓
Koh Khel		1.0	-1.000	7.90	7.40	4.55	4.40	4.26	4.20	4.13	4.10	4.08	↓	↓	↓	↓	↓	
Neak Luong		0.0	-0.330	8.00	7.50	3.51	3.30	3.13	2.97	2.90	2.82	2.78	↓	↓	↓	↓	↓	↓
Prek Kdam		33.4	0.080	10.00	9.50	3.99	3.84	3.67	3.59	3.50	3.45	3.42	↓	↓	↓	↓	↓	↓
Tan Chau		6.9	0.000	4.50	3.50	1.12	1.00	0.93	0.88	0.83	0.81	0.81	↓	↓	↓	↓		
Chau Doc		103.0	0.000	4.00	3.00	0.92	0.90	0.80	0.74	0.70	0.69	0.68		↓	↓	↓		

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 below average at the upper and middle parts. However, at the lower part it was above average, varying from 4 mm to 168 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 lower part of the LMB from Kratie to Tan Chau and Chau Doc area (up to 168 mm). Compared with last week's amount, it was considered higher at the downstream part.

Neither tropical depressions nor tropical storms in the LMB were detected during this reporting week. On September 7, continuing from last week 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, rainfall is likely to 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 rainfall concentration over the LMB in the upcoming week (near average rainfall expected).

7.2 Water level and its forecast

Water levels at most of the monitoring locations in the LMB during this reporting week fell to **a critical level**, causing a significant drop below their long-term averages and even lower than their minimum levels. The decrease was attributed to low rainfall in the middle part of the LMB. In general, compared with last reporting period, this week's water levels were lower.

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 most of the stations in the LMB are expected to continue decreasing, ranging from -0.15 and -0.02 metres. This mean, all the stations' water levels are expected to remain below their LTAs.

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

Below average precipitation during the past months is believed to be one of the main factors causing low water levels at most of the stations along the Mekong mainstream.

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

Flash floods are likely to take place in Lao PDR and Viet Nam during next week. Some local communities of the LMB are also expected to receive heavy rain which could lead to minor flash floods.

7.4 Drought condition and its forecast

Drought condition of the LMB from August 27 to September 2 was very much similar to that of the previous week (August 20-26). However, it was getting a bit drier in north of the LMB compared to last week. Severe drought condition was found in west of Chiang Mai, Chiang Rai, Phayao, and Loei pf Thailand and the bordering area of Luang Prabang, Vientane, and Xieng Khuang of Lao PDR. There was some moderate dry in Lao PDR's Xayaburi and Oudomxay, and Thailand's Sisaket, Sakon Nakhon, and Nakhon Phanom. Drought condition during the reporting week was not significant, meaning no serious sign is posed to the region.

The upcoming three-month (September-November) forecast shows 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 is predicted to receive less rain than other areas in September 2020.

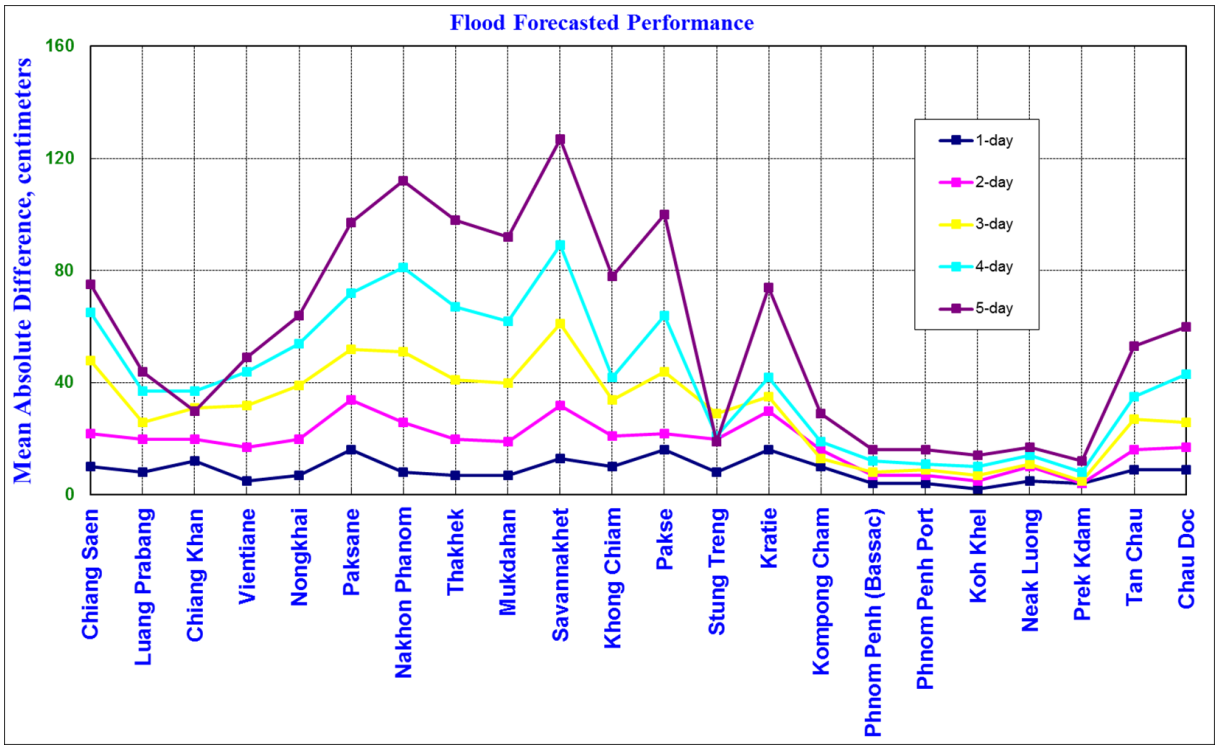
Annex 1: Performance of the weekly flood forecasting

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 01 to 07 September 2020.

The forecasting values from 01 to 07 September 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 Paksane to Pakse due to the hydropower operation and water fluctuation 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 01 – 07 September 2020.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 01 to 07 September 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	10	8	12	5	7	16	8	7	7	13	10	16	8	16	10	4	4	2	5	4	9	9
2-day	22	20	20	17	20	34	26	20	19	32	21	22	20	30	16	7	7	5	10	4	16	17
3-day	48	26	31	32	39	52	51	41	40	61	34	44	29	35	13	8	9	7	11	5	27	26
4-day	65	37	37	44	54	72	81	67	62	89	42	64	21	42	19	12	11	10	14	8	35	43
5-day	75	44	30	49	64	97	112	98	92	127	78	100	19	74	29	16	16	14	17	12	53	60

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 01 to 07 September 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	71.4	71.4	57.1	71.4	57.1	57.1	57.1	71.4	57.1	71.4	57.1	42.9	57.1	71.4	57.1	28.6	42.9	42.9	57.1	***59.1***
2-day	50.0	50.0	66.7	66.7	66.7	66.7	66.7	66.7	66.7	33.3	50.0	66.7	50.0	66.7	66.7	66.7	33.3	66.7	50.0	66.7	50.0	33.3	***57.6***
3-day	60.0	60.0	80.0	60.0	60.0	60.0	60.0	60.0	40.0	60.0	40.0	60.0	60.0	60.0	40.0	40.0	60.0	60.0	60.0	60.0	40.0	40.0	***55.5***
4-day	50.0	50.0	25.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	75.0	50.0	50.0	50.0	75.0	50.0	50.0	25.0	25.0	25.0	***47.7***
5-day	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	66.7	33.3	33.3	66.7	66.7	33.3	33.3	66.7	66.7	66.7	33.3	66.7	66.7	66.7	***47.0***

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 01 to 07 September 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	*10:08*	*00:00*	-	-	*08:15*	*07:10*	*07:09*	*08:15*	*08:37*	*08:29*	*07:00*	*08:12*	*0*	*0*	*1*	*0*	*75*	*0*	*1*	*0*
month	*10:24*	*00:00*	-	-	*08:15*	*07:10*	*07:38*	*08:11*	*08:39*	*08:26*	*07:14*	*08:13*	*0*	*0*	*37*	*0*	*464*	*0*	*2*	*38*

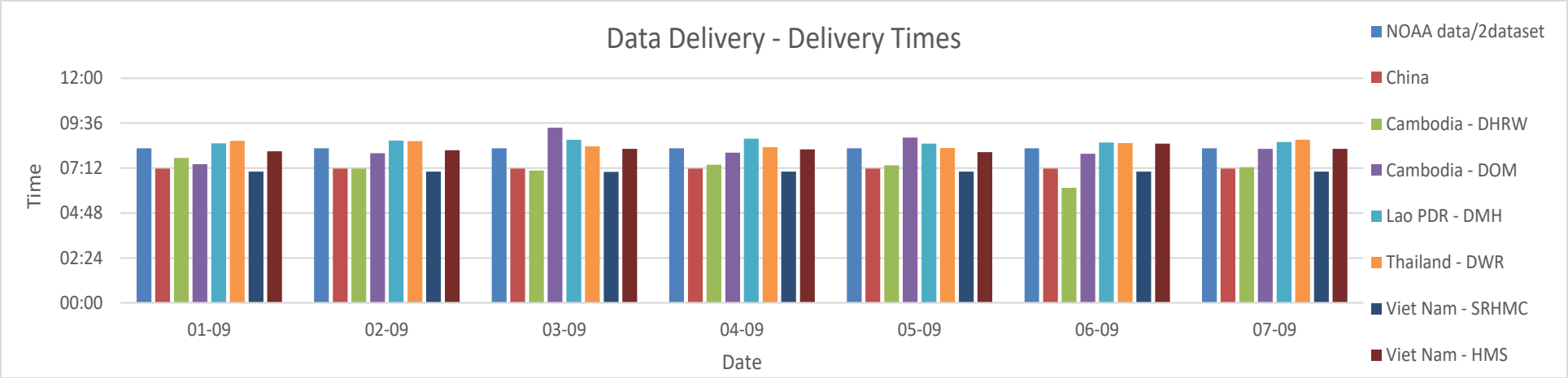


Fig. B4: Data delivery times for the past 8 days from 01 to 07 September 2020

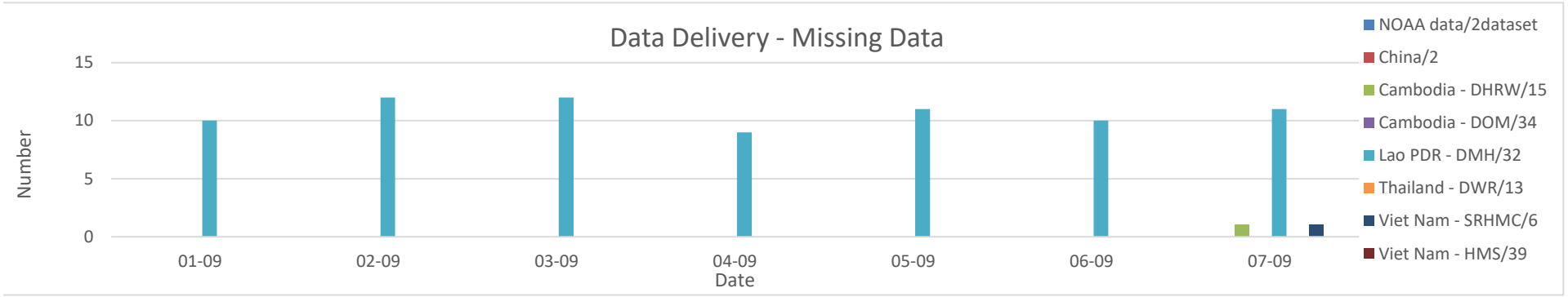


Fig. B5: Missing data for the past 7 days from 01 to 07 September 2020

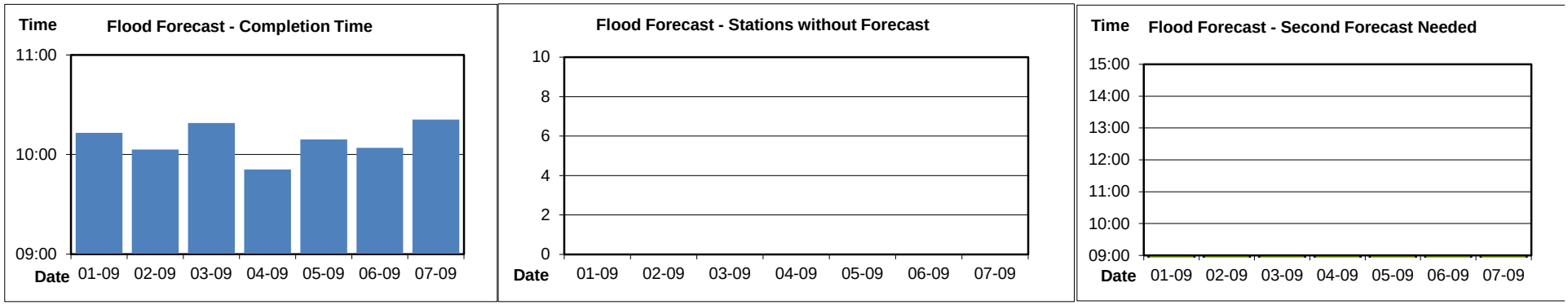


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 01 to 07 September 2020

Mekong River Commission Secretariat

P. O. Box 6101, 184 Fa Ngoum Road, Unit 18 Ban Sithane Neua, Sikhottabong District, Vientiane 01000, Lao PDR
Tel: +856 21 263 263. Fax: +856 21 263 264 ww.mrcmekong.org