



Mekong River Commission

Weekly Wet Season Situation Report in the Lower Mekong River Basin 22 – 28 September 2020

Prepared by
The Regional Flood and Drought Management Centre
29 September 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 **22 - 28 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. All water level indicated in this report referred to 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
- 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 and October will continue in the north-eastern part of Thailand (within the Mekong region).

[Figure 1](#) presents the weather map of 27 September 2020, showing two lines of low pressure of the Monsoon Trough crossing the upper Mekong region which can bring some rainfall over the next few days, a situation that has persisted over the last couple of weeks.

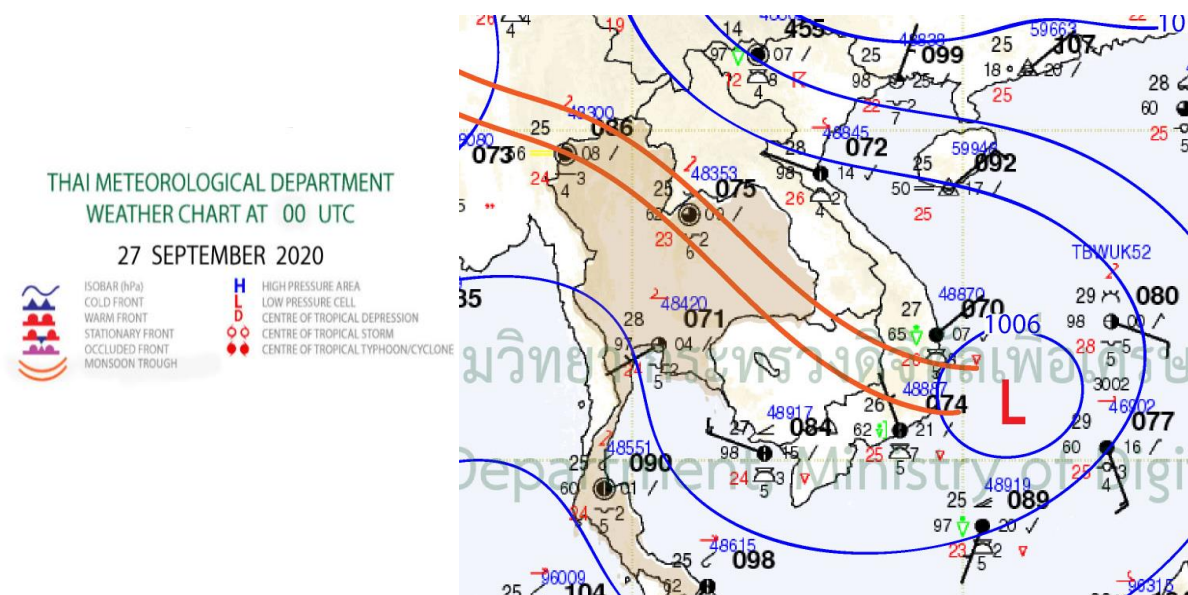


Figure 1: Summary of weather conditions over the LMB

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).

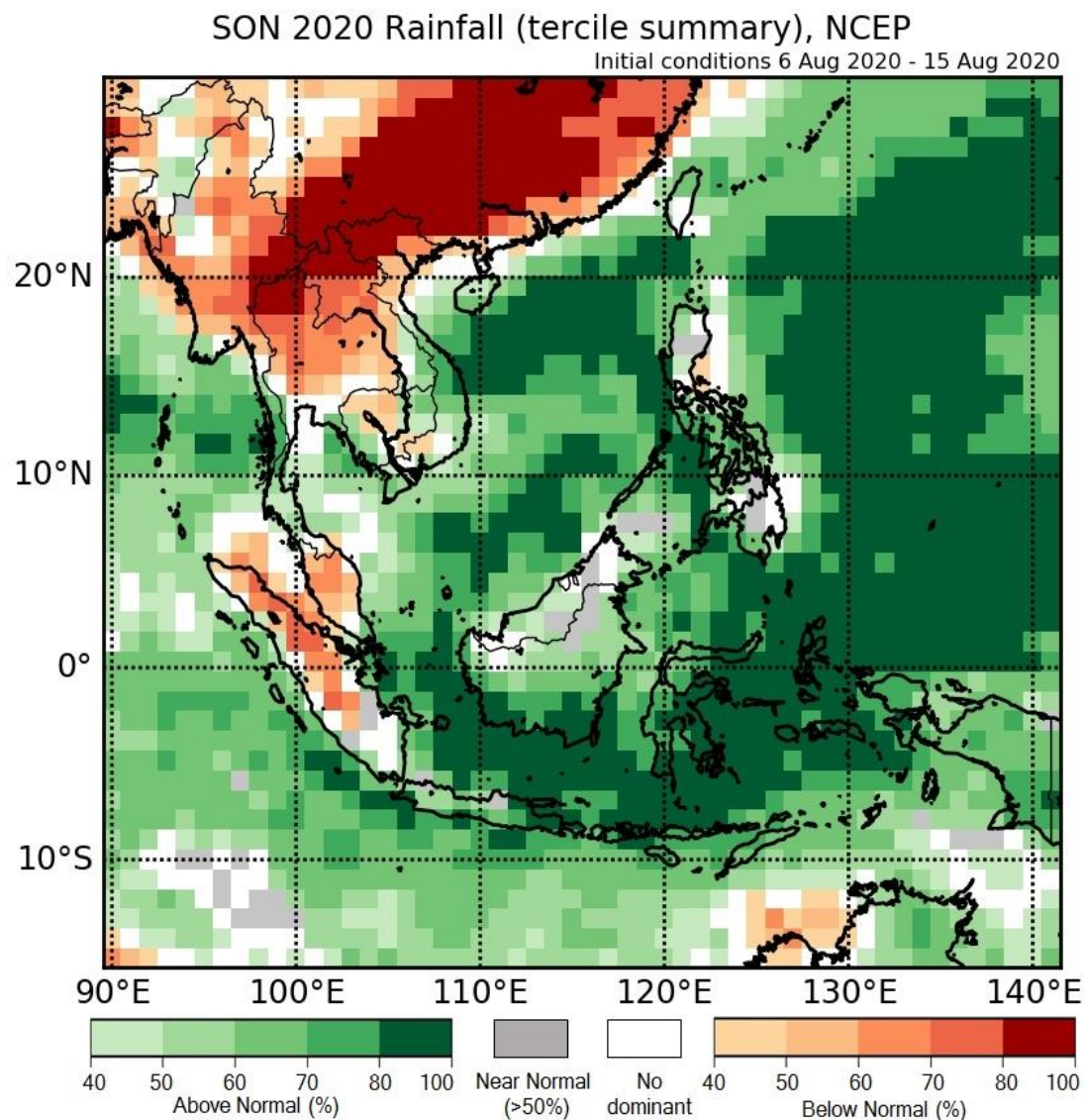


Figure 2: Predicted rainfall over the Asian countries by ASMC

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

There was a low pressure hitting the LMB during 25 and 28 September 2020, causing heavy rainfall in the lower part of Kompong Cham in Cambodia, as well as in the 3S area (Se Kong, Se San and Sre Pok) and the Mekong Delta in Viet Nam. Up to September 28, there are still two lines of low pressure moving across the upper part in northeast Thailand of the Mekong Region, which could bring some rain in the northern part of the LMB. [Figure 3](#) shows affected areas in the lower part of the Mekong floodplain and Delta area due to low pressure on September 27.

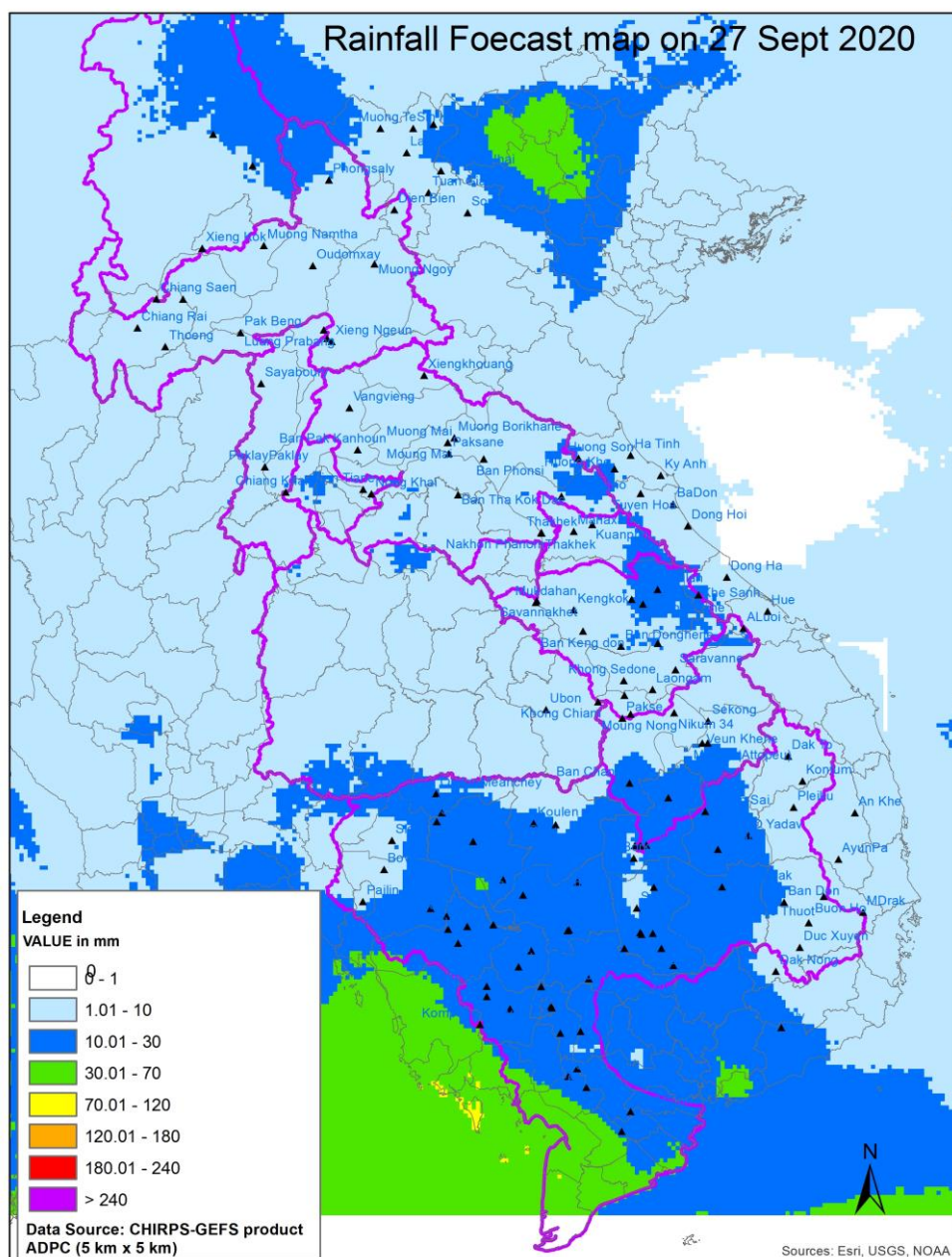


Figure 3: Areas affected due to low pressure in the Mekong Region

Rainfall patterns over the LMB

This week's rainfall is considered below average, varying from 0.3 mm to 140 mm at different stations along the LMB from Chiang Saen in Thailand to Tan Chau and Chau Doc in Viet Nam. Unlike the situation last week, rainfall during this reporting week concentrated in the upper part from Chiang Saen to Paksane and the lower parts from Cambodia's Chaktomuk to Viet Nam's Tan Chau and Chau Doc, ranging from 50 mm to 120 mm. This means the middle part of the LMB received less amount of rainfall compared to other areas. The total observed rainfall of the week at those selected stations is shown in [Figure 4](#).

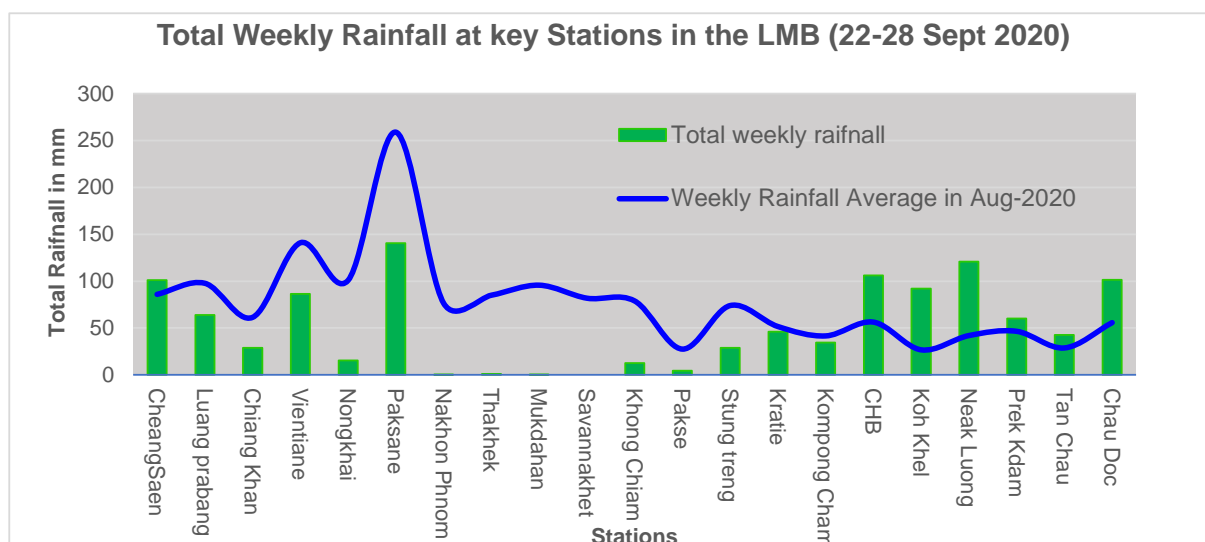


Figure 4: Weekly total rainfall at key stations in the LMB

To verify area rainfall distribution, [Figure 5](#) 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 September 22 to 28.

The amount of rainfall this week – from 0.3 mm to 120 mm – is considered higher than average in the lower part of the basin from Cambodia’s Chaktomuk to Viet Nam’s Tan Chau and Chau Doc, but was lower than average in the upper part from Thailand’s Nakhon Phanom to Lao PDR’s Pakse.

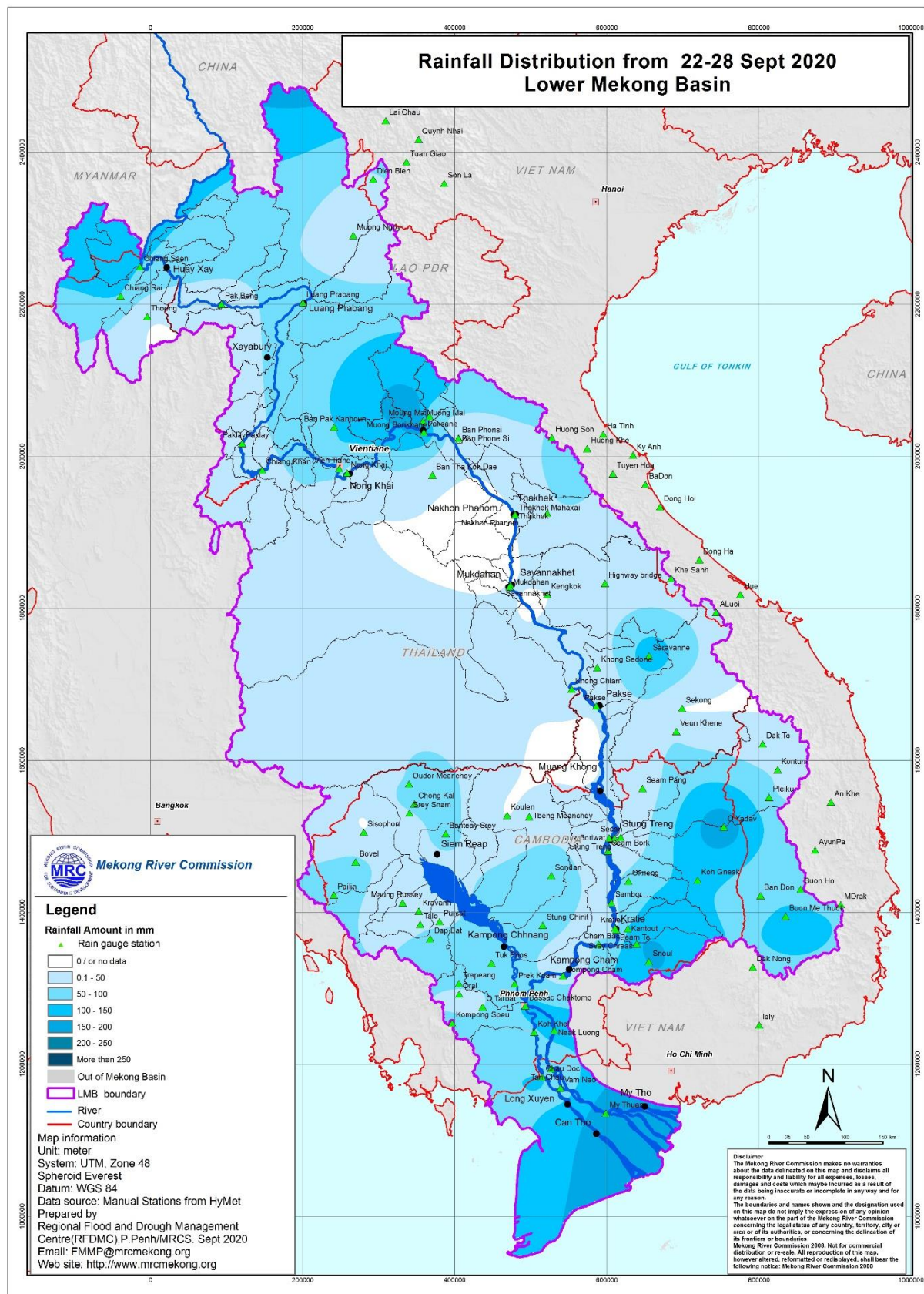


Figure 5: Weekly rainfall distribution over the LMB

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 Upper Mekong Basin (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 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>.

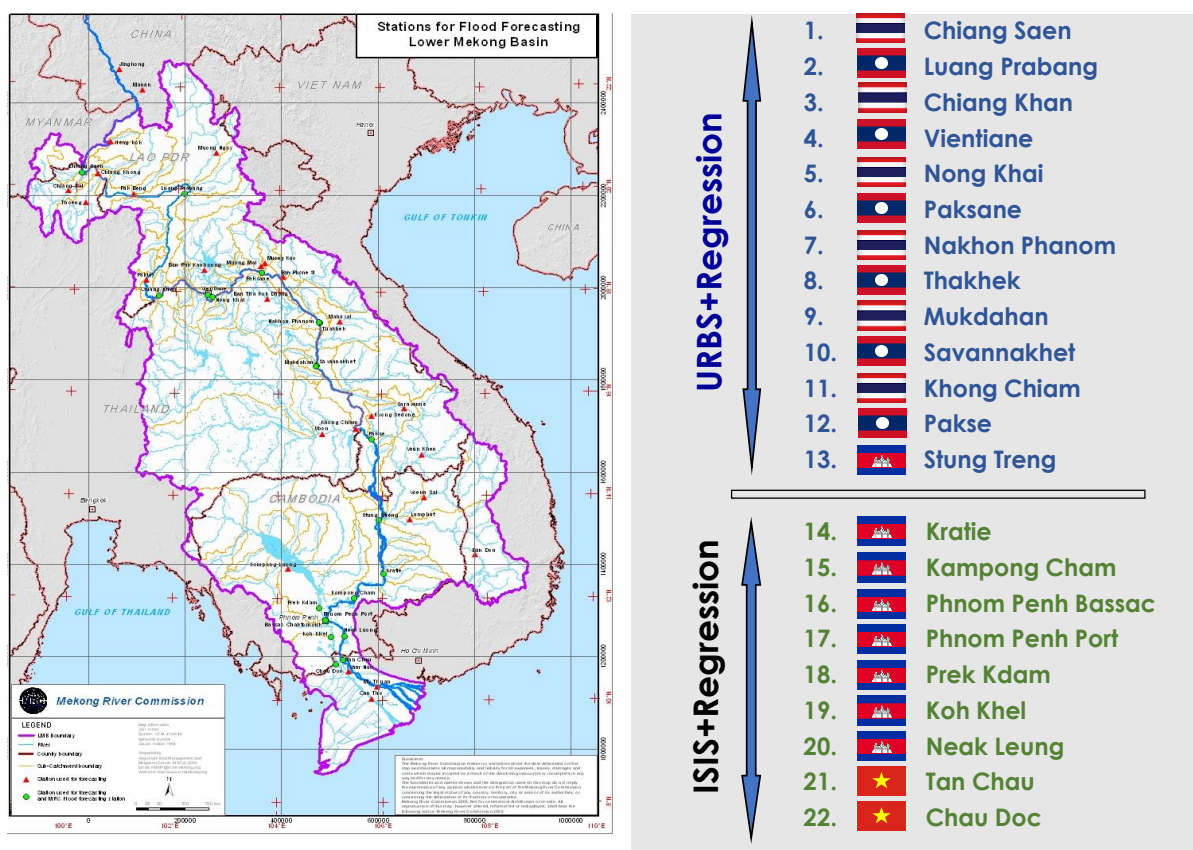


Figure 6: Key stations and model application for River Monitoring and Flood Forecasting

Chiang Saen and Luang Prabang

Water level during September 22-28 at Chiang Saen station in Thailand was fluctuating between -0.38 metres and 0.38 metres. 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 continued lower rainfall over recent weeks contributed by catchment inflows. When comparing to last week, this week's water level is relatively lower.

Water level at Luang Prabang monitoring station in Lao PDR was also slightly fluctuating, between -0.21 metres and 1.06 metres, during the reporting period. Compared to last week, the figure shows an increasing number, from 9.75 metres to 10.38 metres. This level is higher than that of 2019 and now stays closer to 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 level at this station can possibly change very rapidly during the wet season.**

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Chiang Khan in Thailand decreased from 8.90 metres last week to 8.23 metres this week, showing 1.80 metres below its LTA value. The level is at minimum record and is similar to the record in 1992.

Downstream water levels from Vientiane to Paksane in Lao PDR followed the same direction of the Chiang Khan's one. The fluctuation varied between -0.43 and 0.61 metres. Less water contribution from upstream inflows and rainfall from sub-catchments are likely the main reason. **Compared to this time last year, the current water levels at these stations are about 3.6 meters higher.**

Nakhon Phanom to Pakse

Similarly, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR were slightly increasing during the reporting period, ranging from 0.67 to -0.12 metres. Moderate rainfall in upstream and its adjacent catchments is likely the cause of these increasing water levels. Figure 6 shows that the water levels at these two stations raised from 0.97 to 3.00 meters above their LTAs. [Figure 7](#) shows that water levels at these two stations were rising above their historical minimum levels. **During this week, the water levels at the two stations were higher than their historical minimum values, when last 2 weeks they were lower and considered critical.**

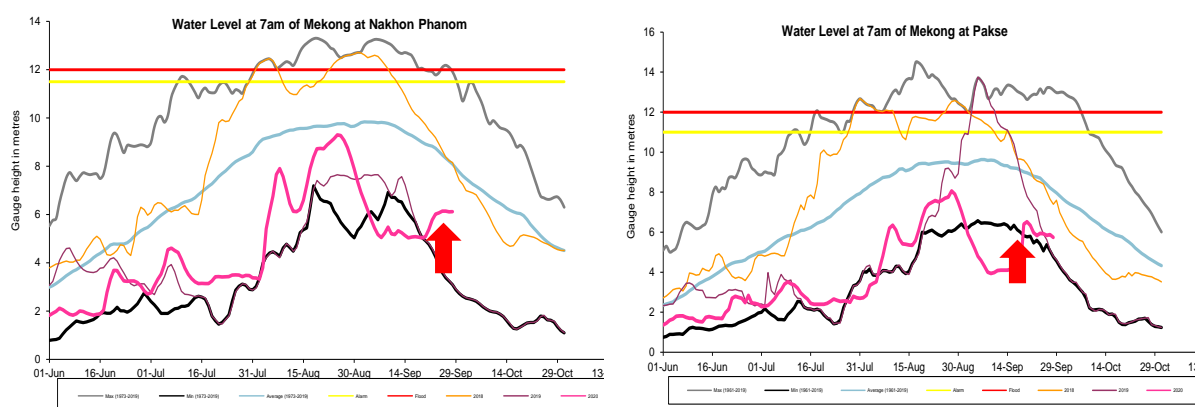


Figure 7: Water levels at Nakhon Phanom of Thailand and Pakse of Lao PDR

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 slightly decreasing, dropping about 0.5 metres and were even lower than last week. **From Kampong Cham to Neak Luong, as shown in [Figure 8](#), the levels are considered critical.**

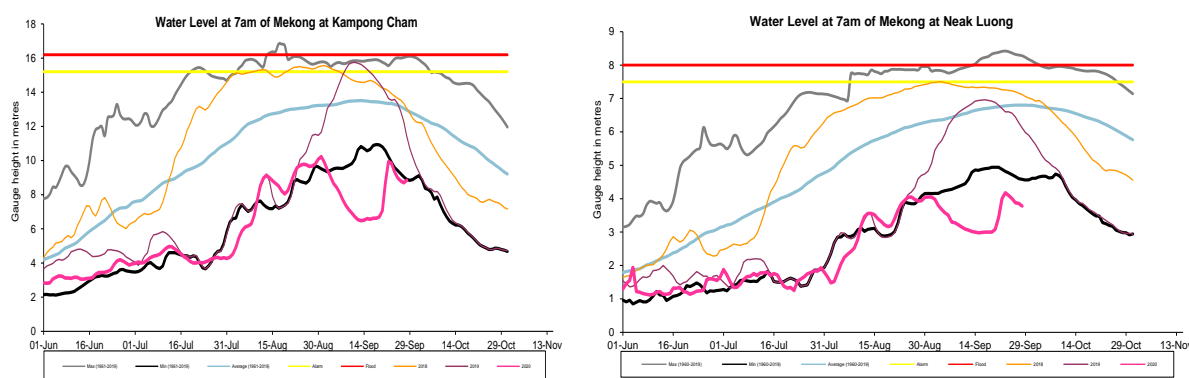


Figure 8: Water levels at Kratie on Mekong River and Prek Kdam on Tonle Sap River

Tidal stations at Tan Chau and Chau Doc

Like last week, water levels at the two tidal stations of Viet Nam's 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.**

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 9](#) 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 28 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 10](#) shows seasonal changes in monthly flow volume up to September 28 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 September (up to 21) 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 a 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.

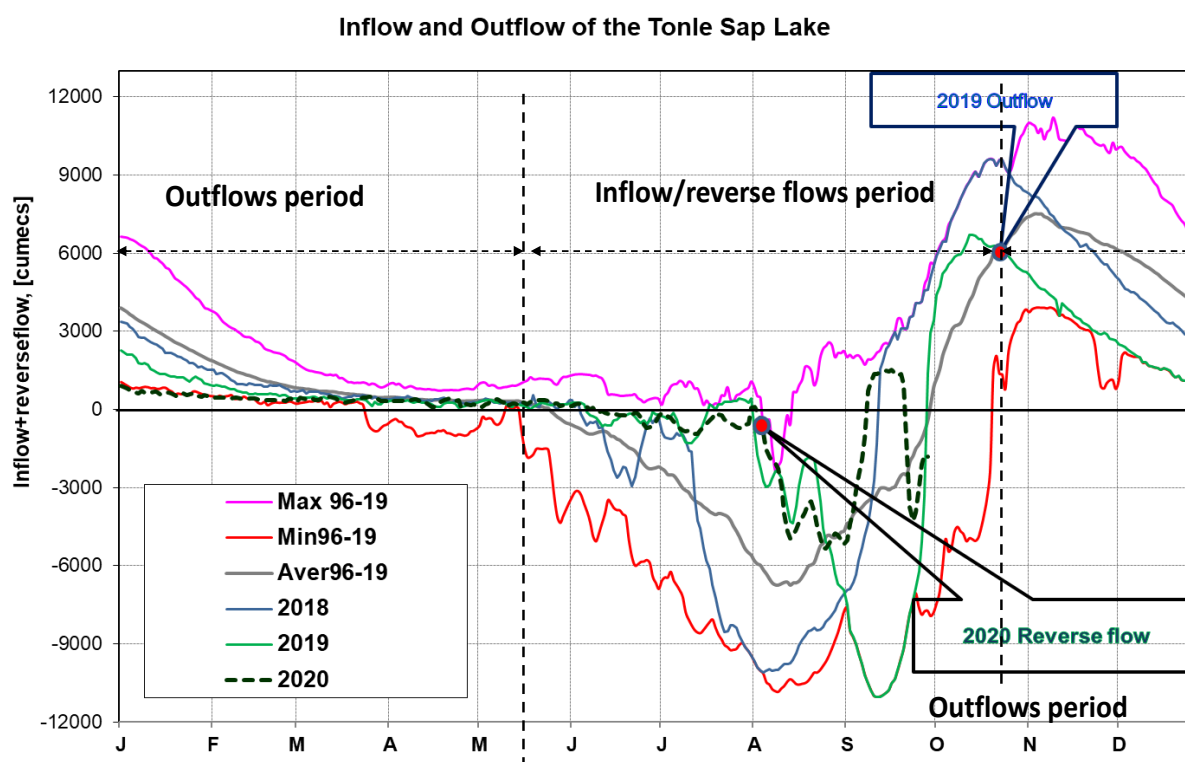


Figure 9: Seasonal change of inflows and outflows of Tonle Sap Lake

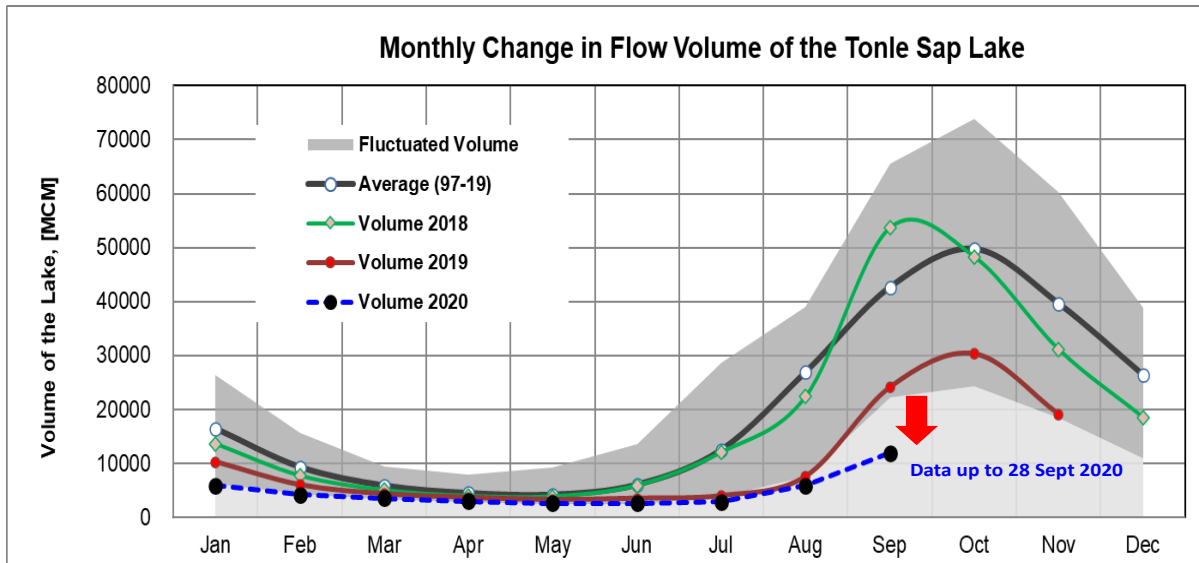


Figure 10: The seasonal change in monthly flow volume of Tonle Sap Lake

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	11957.39	28.04
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, compared with historical Min values						
	Normal condition, compared with LTA (Long term average)						
	Low volume situation, compared with LTA values						
Percentage compared with Average Volume							
Unit: Million Cubic Meter (1 MCM= 0.001 Km ³)							

4 Flash Flood in the Lower Mekong Basin

During September 23 – 24, a low pressure moved from China, passed through Viet Nam and Lao PDR and caused downpour in the upper and middle parts of the LMB. During September 26-28, the Southwest Monsoon prevailed over the LMB, bringing downpour in the lower part of the region which covers Cambodia and Viet Nam. According to the MRC-Flash Flood Guidance System (FFGS) and analysis, flash flood events were detected in some areas of Viet Nam, Lao PDR and Cambodia with the impacts ranging from low to moderate level, as shown in [Figure 11](#) and [Table 2](#).

The figure and table below also show the FFG results for the next three and six hours produced on September 24, and three hours on September 28 at 00:00 UTC (07:00 AM local time).

Table 2: Detected flash flood in Viet Nam and Lao PDR on 24 Sep and in Cambodia on 28 Sep

01-Hour Flash Flood Risk and Location in Viet Nam					3-Hour Flash Flood Risk and Location in Viet Nam					6-Hour Flash Flood Risk and Location in Viet Nam				
Provinces	Districts	Region	Level Risks		Provinces	Districts	Region	Level Risks		Provinces	Districts	Region	Level Risks	
NO ANY DETECTION OF FLASH FLOOD WITHIN NEXT 01-HOUR					Son La	Moc Chau	Northwest	Low-Risk		Nghe An	Tuong Duong	North Central	Moderate-Risk	
					Nghe An	Tuong Duong	North Central	Moderate-Risk		Nghe An	Quy Chau	North Central	Low-Risk	
					Nghe An	Quy Chau	North Central	Low-Risk						
01-Hour Flash Flood Risk and Location in Lao PDR					03-Hour Flash Flood Risk and Location in Lao PDR					06-Hour Flash Flood Risk and Location in Lao PDR				
Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk
NO ANY DETECTION OF FLASH FLOOD WITHIN NEXT 01-HOUR					Bolikhamxay	Pakxanh	XAYSAVANG	Central Laos	Low-Risk	Bolikhamxay	Pakxanh	XAYSAVANG	Central Laos	Low-Risk
01-Hour Flash Flood Risk and Location in Cambodia					03-Hour Flash Flood Risk and Location in Cambodia					06-Hour Flash Flood Risk and Location in Cambodia				
Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk	Provinces	Districts	Villages	Region	Level Risk
NO ANY DETECTION OF FLASH FLOOD WITHIN NEXT 01-HOUR						Kampong Speu	Aoral	Choam Leu	Low-Risk		Kampong Speu	Aoral	Choam Leu	Low-Risk

FFG - 03 hr 2020-09-24 00:00 UTC REGIONAL mm/6hr 150.00 100.00 70.00 40.00 25.00 10.00 0.00	FFG - 06 hr 2020-09-24 00:00 UTC REGIONAL mm/6hr 200.00 150.00 100.00 70.00 40.00 25.00 10.00 0.00	FFG - 03 hr 2020-09-28 00:00 UTC REGIONAL mm/3hr 150.00 100.00 70.00 40.00 25.00 10.00 0.00

Figure 11: Flash Flood Guidance for next 3 and 6 hours on Sep 24 and 3 hours on Sep 28

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from September 17-23

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)

Drought condition of the LMB from September 17-23, as shown in [Figure 12](#), changed drastically compared to the previous week. Meteorological indicator of SPI shows that the LMB received surplus rainfall during the monitoring week. Xaysomboun and Borikhamxay of Lao PDR, Kratie and Stung Treng of Cambodia, and Kon Tum and Gia Lai of Viet Nam were the wettest provinces.

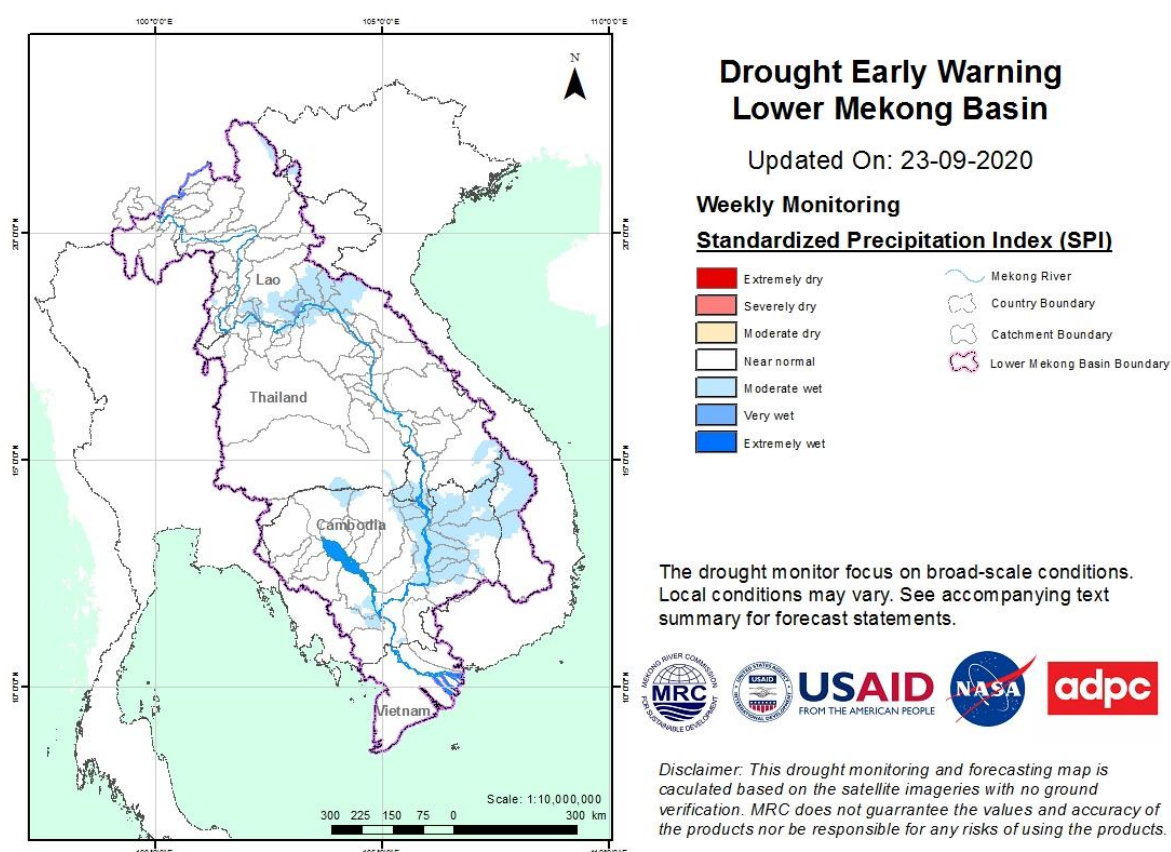


Figure 12: Weekly standardised precipitation index from September 17-23

• Weekly Soil Moisture Anomaly (SMA)

Though meteorological indicator shows no drought hazards during September 17-23, the agricultural indicator through soil moisture anomaly index of the LMB, as shown in [Figure 13](#), presents some severe and extreme dryness in the north, moderate dryness in the central part over Thailand, and moderate dryness in south-east LMB covering some parts of Monduliri of

Cambodia and Central Highland of Viet Nam. Spatially, soil moisture condition shows similar condition over the same location compared to last week. However, drought magnitude was getting worse in the north and better in central and southern parts of the LMB from 17-23 September.

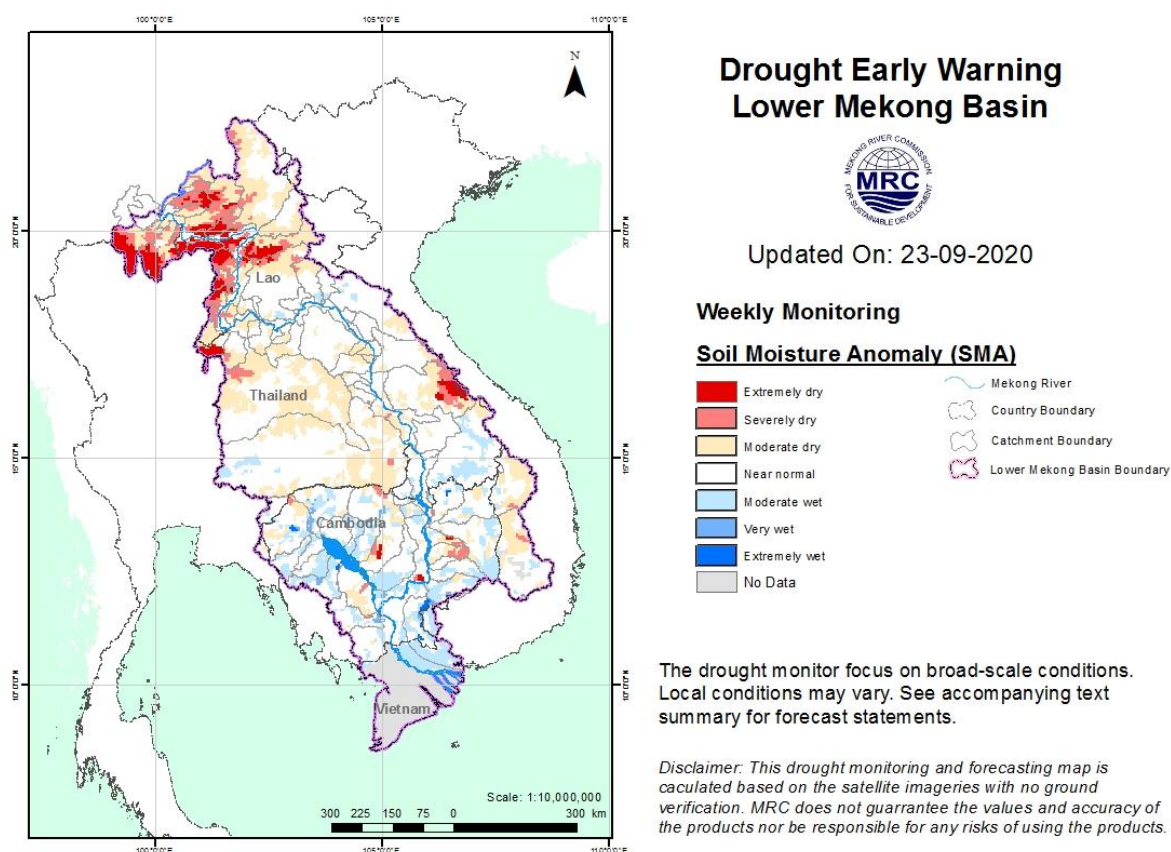


Figure 13: Weekly Soil Moisture Anomaly from September 17-23

• Weekly Combined Drought Index (CDI)

The overall drought condition through combined drought index, as shown in [Figure 14](#), shows no drought threat over the region. The only moderate dry condition is found in northern region covering a small portion of Chiang Mai, Chiang Rai and Phayao of Thailand, and Luang Namtha, Oudomxay, Luang Prabang, and Xayaburi of Lao PDR.

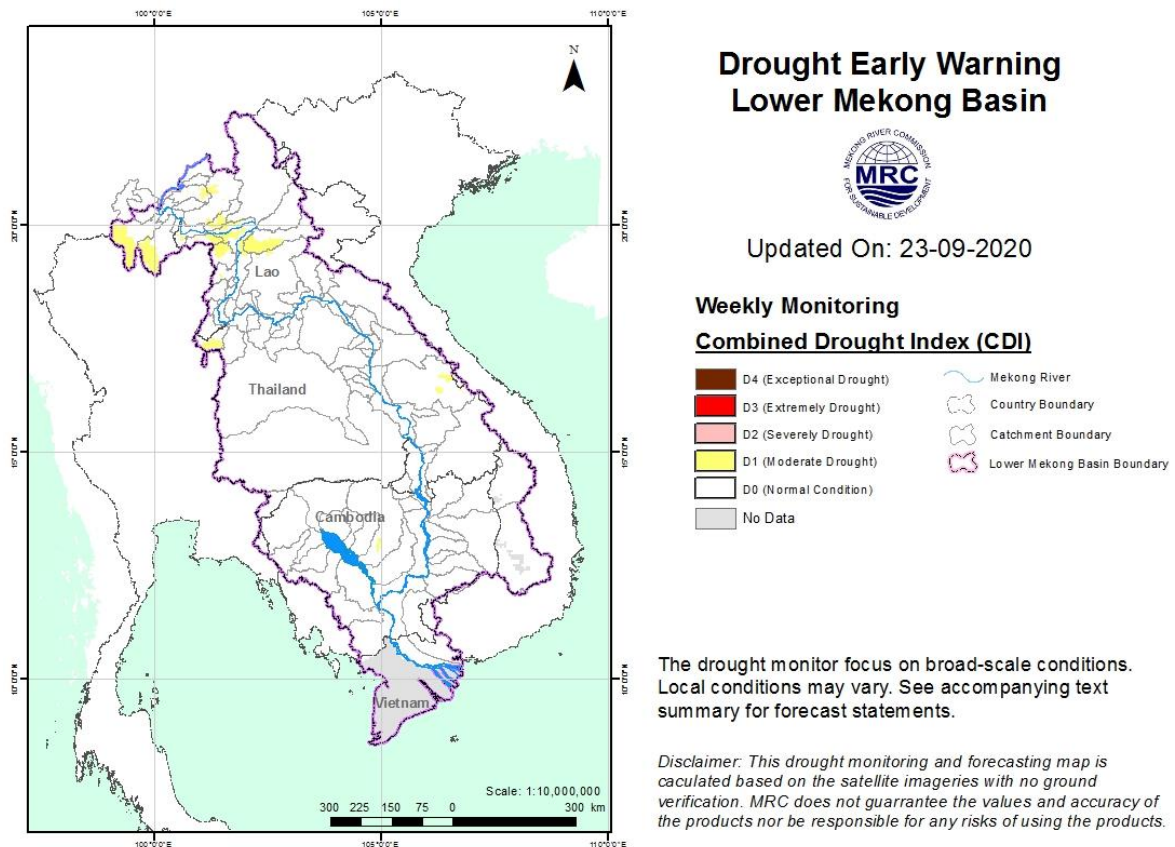


Figure 14: Weekly Combined Drought Index during Sep 17-23

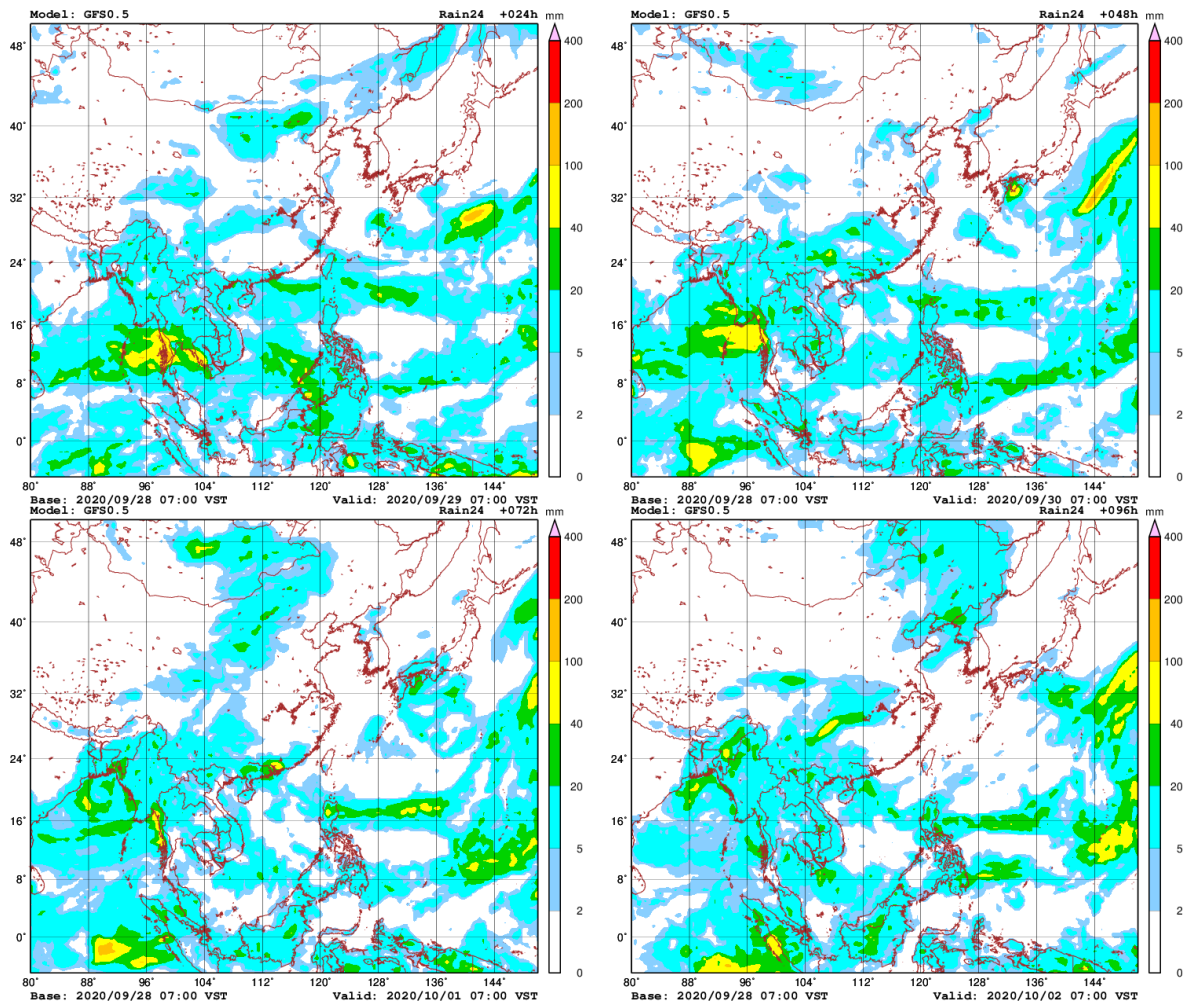
More information on Drought Early Warning and Forecasting as well as the explanation is available here: <http://droughtforecast.mrcmekong.org/templates/view/our-product>

6 Weather and Water Level Forecast and Flash Flood Information

6.1 Weather and rainfall forecast

Based on the analysis of synoptic meteorological information, in the coming week there might be two factors affecting the LMB region. They include (i) Low Pressure (L) and (ii) the Southwest Monsoon. According to the accumulated rainfall forecast (24 hrs) of the Global Forecast System (GFS) model, small (5 – 20 mm/24hrs) and moderate rainfall (20 – 40 mm/24hrs) will possibly occur in the coming week over the LMB.

[Figure 15](#) shows the accumulated rainfall forecast (24hrs) of the GFS model from September 29 through October 5.



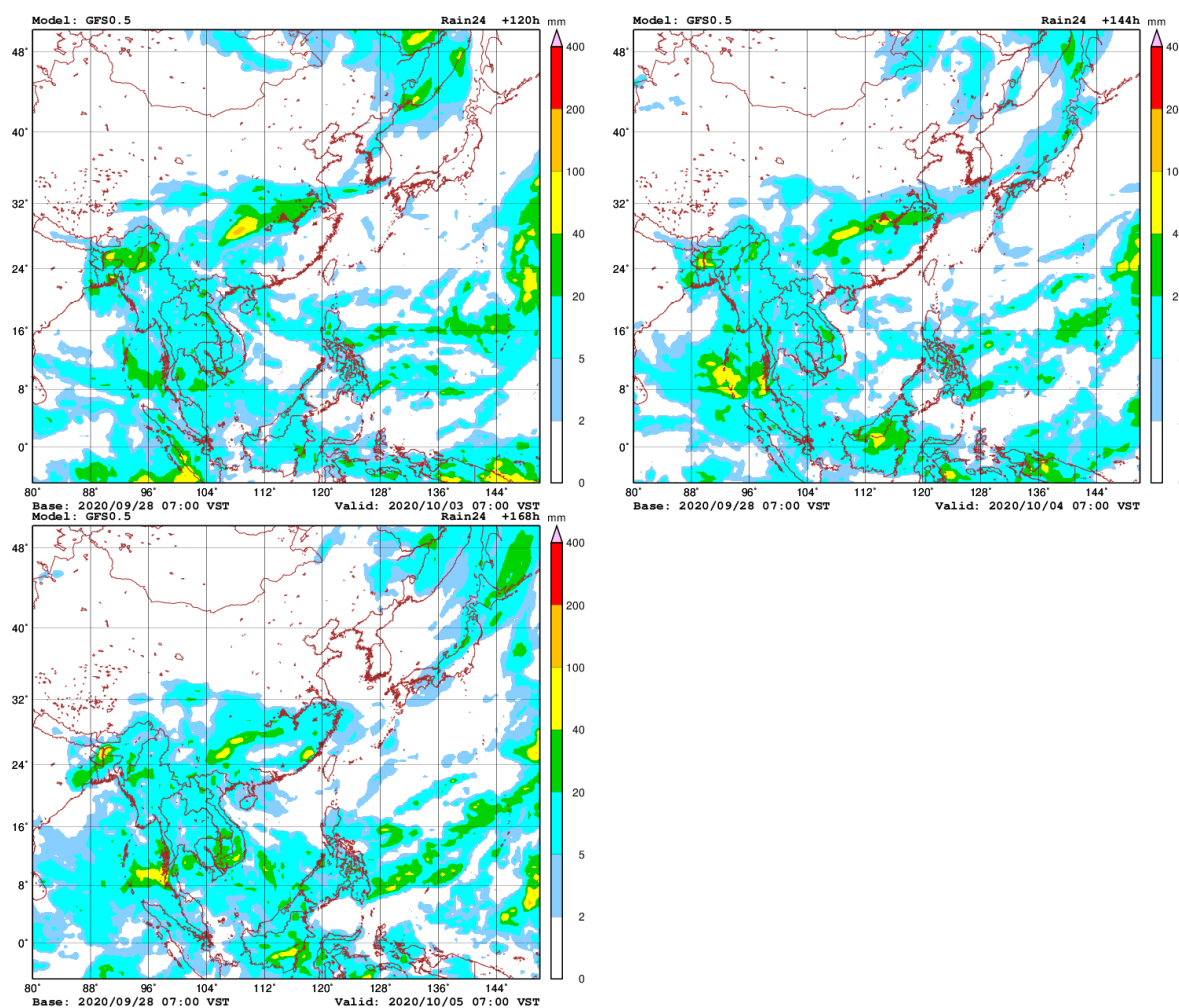


Figure 15: Accumulated rainfall forecast (24 hrs) of model GFS¹

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on September 28's daily flood bulletin, the daily forecast water level at Chiang Saen in Thailand is expected to slightly increase from 3.66 to 4.08 metres in the next five days.

For Luang Prabang in Lao PDR, the water level will also increase from around 10.38 to 10.83 metres during the same period.

Despite this increase, the trend of water levels at these stations will continue staying below their LTAs.

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Vientiane station in Lao PDR is forecasted to go up from 5.55 to 5.79 metres. At Paksane in Lao PDR, level will also increase slightly from 7.64 to 7.68 metres in the next five

days. Average quantity of precipitation is forecasted in the area. Despite that, the water levels here will still be lower than their LTAs.

Nakhon Phanom to Pakse

Water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR will slightly decrease about 0.07 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 in Cambodia, water levels will also decrease from 0.04 to 0.11 metres in the next five days.

Water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port, as well as at Phnom Penh, Chaktomuk, and Koh Khel on the Bassac River, will decrease about 0.05 metre over the next five days.

Even with some anticipated rain in the areas, the water levels at these stations will continue staying below their minimum levels, particularly from Kampong Cham to Neak Luong.

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 3](#) shows the River Flood Forecasting Bulletin issued on September 28. 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 22-28, is presented in [Annex 1](#).

6.3 Flash Flood Information

With some potential rainfall forecasted for next week, flash flood event is likely not to happen next week in the Lower Mekong Basin. However, the local heavy rains in a short period of time are also possible with unexpected short flash floods. The information on flash flood guidance for the next one, three, and six hours is updated twice daily at <http://ffw.mrcmekong.org/ffg.php>.

Further detailed information on Flash Flood Information Warnings, 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 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 16](#) of the monthly anomaly maps shows daily average of each month in mm/day from August to December 2020 produced by the NMME.

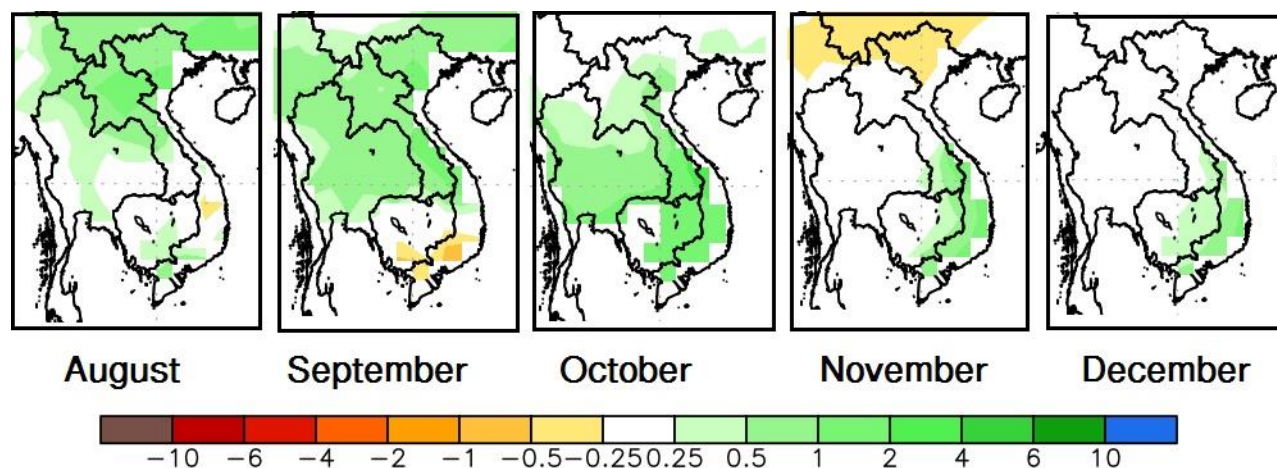


Figure 16: Daily average monthly rainfall forecast from Aug to Dec 2020

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 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: 29 September - 03 October 2020

Date: 28 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					
		27-Sep				27-Sep	28-Sep	29-Sep	30-Sep	01-Oct	02-Oct	03-Oct	28	29	30	01	02	03
Jinghong		21.5				535.59	535.62							X	X	X	X	X
Chiang Saen		63.0	357.110	12.80	11.50	4.04	3.66	3.95	4.03	4.08			↓	↑			★	★
Luang Prabang		4.8	267.195	18.00	17.50	10.17	10.38	10.45	10.65	10.71	10.75	10.83	↑		↑			
Chiang Khan		5.8	194.118	16.00	14.50	8.36	8.23	8.31	8.36	8.48			↓			↑	★	★
Vientiane		0.0	158.040	12.50	11.50	5.85	5.55	5.46	5.55	5.61	5.73	5.79	↓				↑	
Nongkhai		0.0	153.648	12.20	11.40	6.29	6.01	5.93	6.02	6.08			↓				★	★
Paksane		11.9	142.125	14.50	13.50	7.66	7.64	7.55	7.49	7.55	7.60	7.68						
Nakhon Phanom		0.0	130.961	12.00	11.50	6.11	6.12	6.11	6.06	6.03							★	★
Thakhek		0.0	129.629	14.00	13.00	7.26	7.27	7.25	7.19	7.15	7.19	7.25						
Mukdahan		0.0	124.219	12.50	12.00	5.85	5.85	5.85	5.84	5.81							★	★
Savannakhet		0.0	125.410	13.00	12.00	4.32	4.30	4.29	4.28	4.26	4.24	4.26						
Khong Chiam		3.5	89.030	14.50	13.50	7.26	7.20	7.13	7.10	7.07							★	★
Pakse		0.0	86.490	12.00	11.00	5.88	5.74	5.68	5.65	5.62	5.60	5.58	↓	↓				
Stung Treng		0.0	36.790	12.00	10.70	6.33	6.48	6.37	6.33	6.30	6.28	6.27	↑	↓				
Kratie		26.0	-0.101	23.00	22.00	14.38	14.87	15.05	14.94	14.89	14.85	14.82	↑	↑	↓	↓	↓	↓
Kompong Cham		29.1	-0.930	16.20	15.20	8.70	8.84	9.25	9.45	9.34	9.28	9.23	↑	↑	↑	↓	↓	↓
Phnom Penh (Bassac)		32.5	-1.020	12.00	10.50	5.17	5.24	5.43	5.53	5.47	5.44	5.42	↑	↑	↑	↓	↓	↓
Phnom Penh Port		nr	0.070	11.00	9.50	4.19	4.26	4.46	4.56	4.50	4.46	4.43	↑	↑	↑	↓	↓	↓
Koh Khel		25.1	-1.000	7.90	7.40	4.77	4.82	4.95	5.02	4.98	4.95	4.93	↑	↑	↑	↓	↓	↓
Neak Luong		47.2	-0.330	8.00	7.50	3.86	3.78	3.85	4.03	4.13	4.07	4.04	↓	↑	↑	↑	↓	↓
Prek Kdam		23.4	0.080	10.00	9.50	4.24	4.33	4.51	4.61	4.55	4.50	4.47	↑	↑	↑	↓	↓	↓
Tan Chau		17.7	0.000	4.50	3.50	2.00	2.06	2.11	2.14	2.16	2.18	2.16	↑	↑	↑			
Chau Doc		65.0	0.000	4.00	3.00	1.95	2.03	2.09	2.14	2.17	2.19	2.15	↑	↑	↑	↑	↑	↓

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	X
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 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 in the upper and lower parts of the LMB (50 to 140 mm). However, in the middle part it was considered lower than average, varying from 0.3 mm to 13 mm at different stations along the LMB from Nakhon Phanom in Thailand to Pakse in Lao PDR. The highest concentration was from Kampong Cham in Cambodia to Viet Nam's Tan Chau and Chau Doc area (up to 120 mm). Compared with last week's amount, the rainfall this week was considered higher at the downstream part.

There was a low pressure hitting the LMB during 27 and 28 September 2020, causing downpour. ~~There was some negative affect by the low pressure in the lower part of the LMB from September 27 to 28 during this reporting week.~~ The two lines of Monsoon Trough low pressure still continue from the previous weeks, which will still bring some more rainfall to the LMB .

Based on the forecasted rainfall from satellite using GFS data, rainfall is likely to take place in areas between Lao PDR's Pakse, low area of Cambodia and the Central Highland of Viet Nam, varying from 20 mm to 100 mm in October 3. This will increase the chance of rainfall concentration over the LMB in the upcoming week (average rainfall expected).

7.2 Water level and its forecast

Water levels in the lower part of the monitoring locations in the LMB during this reporting week were rising, but still lower than their historical minimum levels. The rising level was due to the low-pressure weather, which brought downpour to the lower part of the region from 27 to 28 September. Generally, this week's water levels were relatively lower than those of last week.

The starting date of the reverse flow from the Mekong River into the Tonle Sap Lake took place on August 4, slightly 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 monitoring stations in the LMB are expected to continue slightly increasing, ranging from 0.05 and 0.20 metres. Even so, 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

With predicted small and average amount of rainfall for the coming week as mentioned earlier in [section 6.1](#), major flash floods are not likely to happen in the LMB. However, short flash floods in the community are still possible. Soil moisture condition in local community of the region remains highly saturated due to the remaining exhaustion of rainwater in the ground from the previous weeks especially from the middle to lower part of the LMB including Lao PDR, Cambodia and Viet Nam.

7.4 Drought condition and its forecast

Drought condition of the LMB from September 17-23 was much better than last week (September 10-16). The region showed no meteorological drought during the monitoring week. However, severe and extreme dry soil moisture kept persisting in northern part of the LMB. In general, drought condition was getting much better - with no potential threat - over 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.

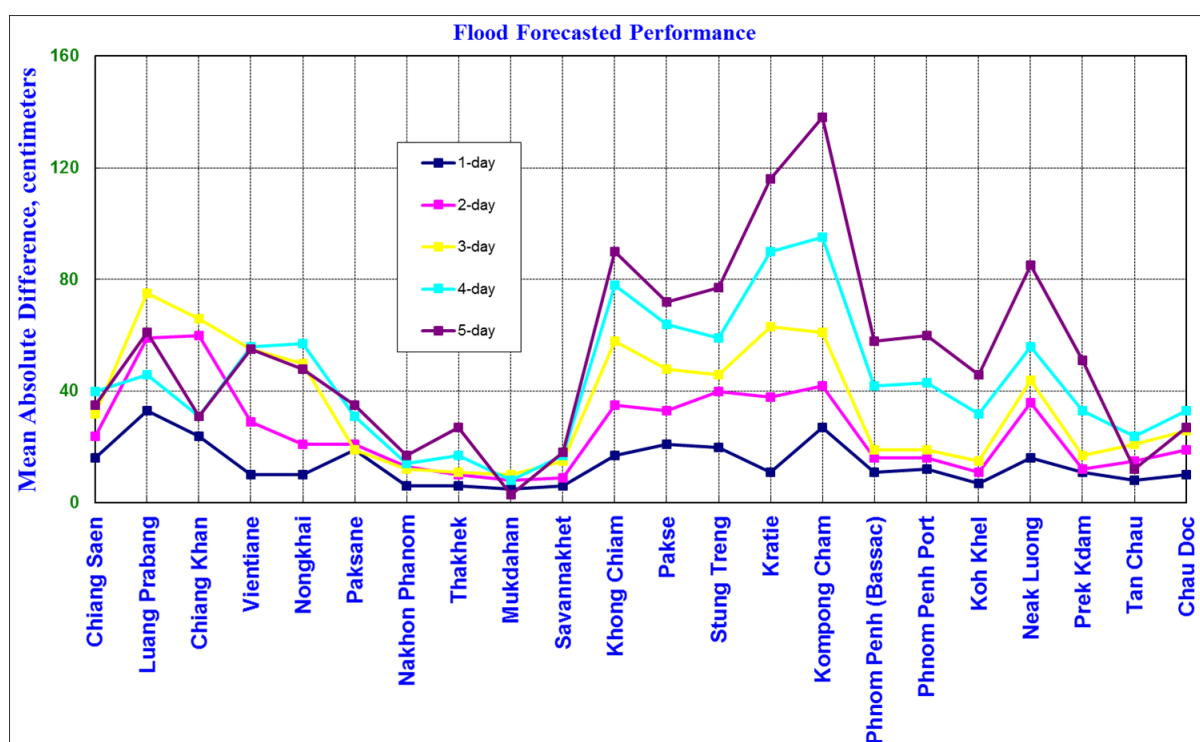
Annex 1: Performance of the weekly flood forecasting

Accuracy

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

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 22 to 28 September 2020.

The forecasting values from 22 to 28 September 2020 show that the overall accuracy is fair for 1-day to 3-day forecast in lead time at stations in the middle to the lower parts of the Mekong River from Khong Chiam to Kampong Cham due to the effect of heavy rain in this area during the report period.



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 caused by storms and hydropower operations from upstream (Xayaburi), tributaries inflows and the lower part of the Mekong floodplain.

- 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 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 22 to 28 September 2020.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 22 to 28 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	16	<u>33</u>	<u>24</u>	10	10	19	6	6	5	6	17	<u>21</u>	<u>20</u>	11	<u>27</u>	11	12	7	16	11	8	10
2-day	<u>24</u>	59	60	<u>29</u>	<u>21</u>	<u>21</u>	13	10	8	9	<u>35</u>	<u>33</u>	<u>40</u>	<u>38</u>	<u>42</u>	16	16	11	<u>36</u>	12	15	19
3-day	<u>32</u>	75	66	55	<u>50</u>	19	12	11	10	15	58	<u>48</u>	<u>46</u>	63	61	19	19	15	<u>44</u>	17	<u>21</u>	<u>26</u>
4-day	<u>40</u>	<u>46</u>	<u>31</u>	56	57	<u>31</u>	14	17	8	17	78	64	59	90	95	<u>42</u>	<u>43</u>	<u>32</u>	56	<u>33</u>	<u>24</u>	<u>33</u>
5-day	<u>35</u>	61	<u>31</u>	55	<u>48</u>	<u>35</u>	17	<u>27</u>	3	18	90	72	77	116	138	58	60	<u>46</u>	85	51	12	<u>27</u>

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 22 to 28 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	57.1	57.1	57.1	57.1	<u>42.9</u>	57.1	71.4	85.7	71.4	57.1	57.1	57.1	<u>42.9</u>	71.4	71.4	71.4	71.4	57.1	71.4	71.4	71.4	63.0
2-day	66.7	<u>50.0</u>	<u>33.3</u>	<u>50.0</u>	66.7	66.7	<u>33.3</u>	<u>50.0</u>	66.7	66.7	<u>50.0</u>	66.7	<u>50.0</u>	66.7	66.7	66.7	66.7	<u>50.0</u>	66.7	83.3	<u>50.0</u>	<u>50.0</u>	58.3
3-day	<u>40.0</u>	<u>40.0</u>	<u>40.0</u>	60.0	<u>40.0</u>	80.0	<u>40.0</u>	<u>40.0</u>	60.0	<u>40.0</u>	60.0	60.0	60.0	60.0	80.0	60.0	60.0	60.0	60.0	80.0	<u>40.0</u>	<u>40.0</u>	54.5
4-day	<u>50.0</u>	<u>25.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	60.2
5-day	66.7	<u>33.3</u>	66.7	<u>33.3</u>	66.7	66.7	66.7	66.7	66.7	<u>33.3</u>	66.7	66.7	66.7	<u>33.3</u>	66.7	66.7	66.7	66.7	66.7	66.7	66.7	<u>33.3</u>	59.1

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

Table B3: Overview of performance indicators for the past 7 days from 22 to 28 September 2020

	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
2020																				
week	10:13	00:00	-	-	08:15	07:10	06:57	08:13	08:51	08:30	07:13	08:13	0	0	1	0	70	2	1	0
month	10:24	00:00	-	-	08:15	07:10	07:38	08:11	08:39	08:26	07:14	08:14	0	0	37	0	464	0	2	38

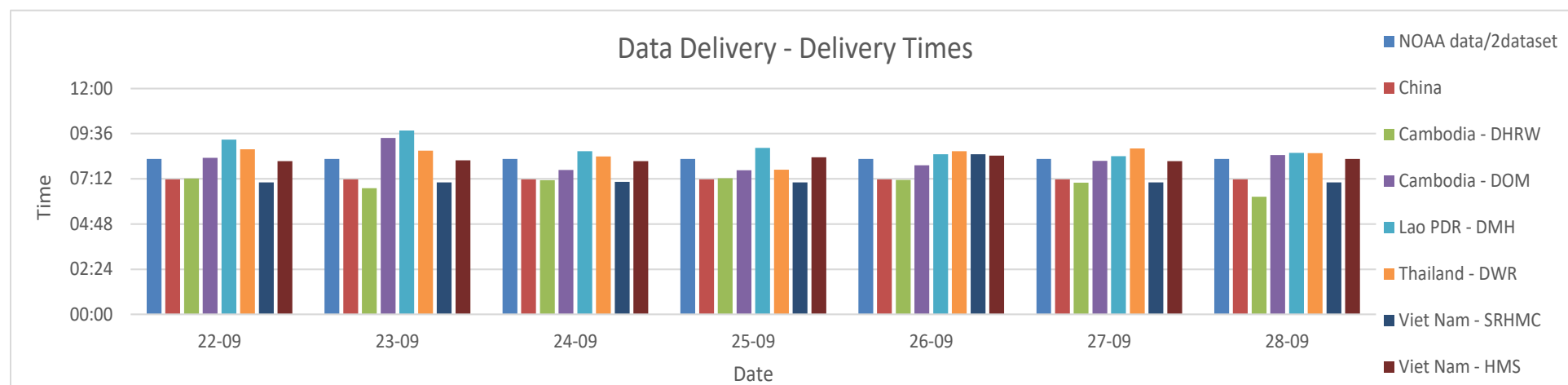


Fig. B4: Data delivery times for the past 7 days from 22 to 28 September 2020

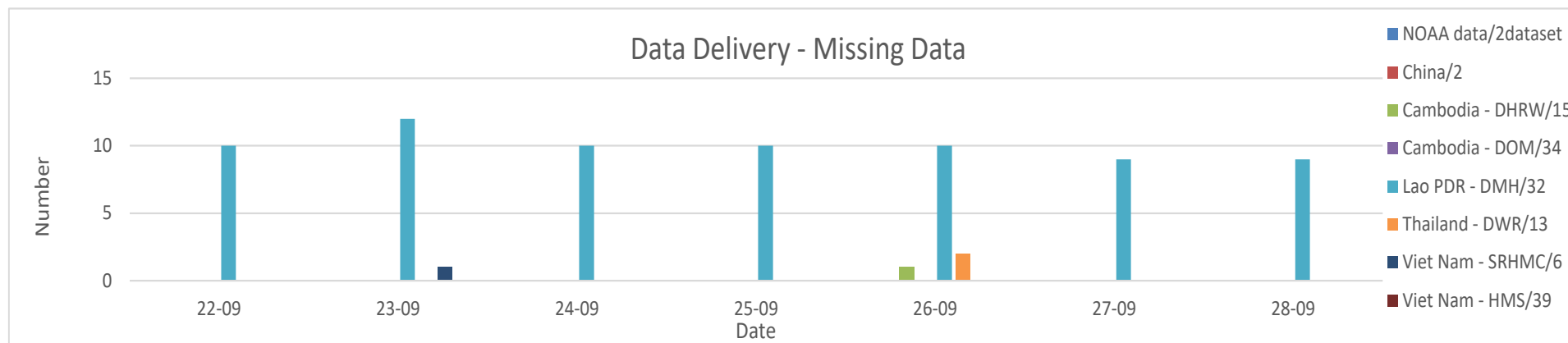


Fig. B5: Missing data for the past 7 days from 22 to 28 September 2020

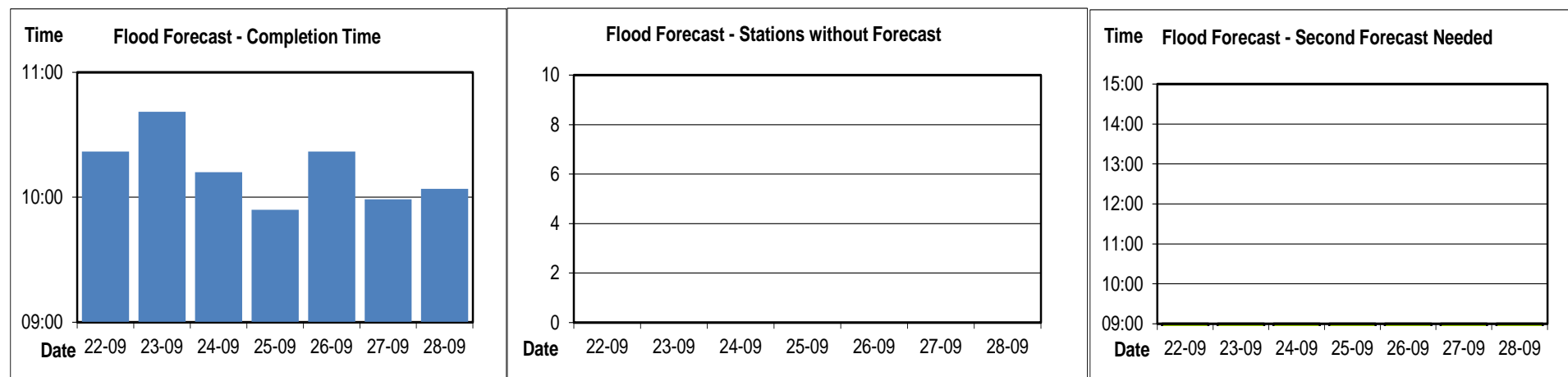


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 22 to 28 September 2020



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