



Mekong River Commission

**Weekly Wet Season Situation Report
in the Lower Mekong River Basin
8 – 14 September 2020**

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

The MRC is funded by contributions from its Member Countries and Development Partners, including Australia, Belgium, the European Union, Finland, France, Germany, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United States and the World Bank.

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First published (2020)

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Title: Weekly wet season situation report in the Lower Mekong River Basin for 08 -14 September 2020

ISSN: 1728-3248

Keywords: flood/drought/weather/Mekong/Tonle Sap

For bibliographic purposes, this volume may be cited as:

Mekong River Commission. (2020). *Weekly wet season situation report in the Lower Mekong River Basin for 08 -14 September 2020*. Vientiane: MRC Secretariat.

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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 **08 - 14 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 will continue in the north-eastern part of Thailand (within the Mekong region).

Figure 1 presents the weather map of 13 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.

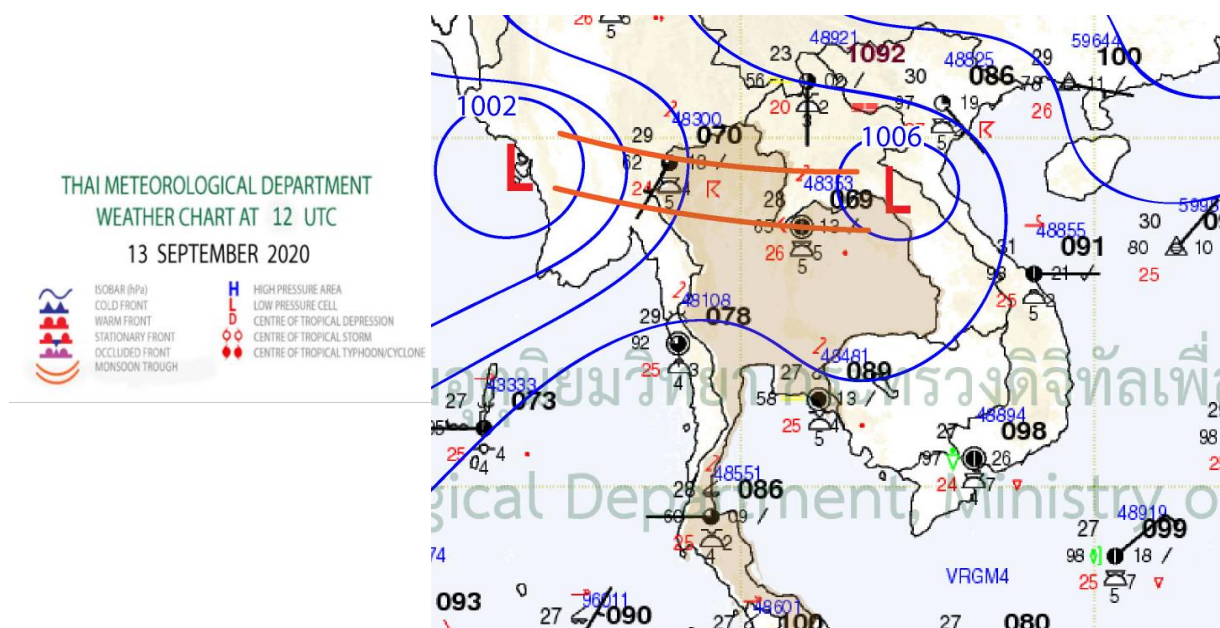


Figure 1. Summary of weather conditions over the LMB

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).

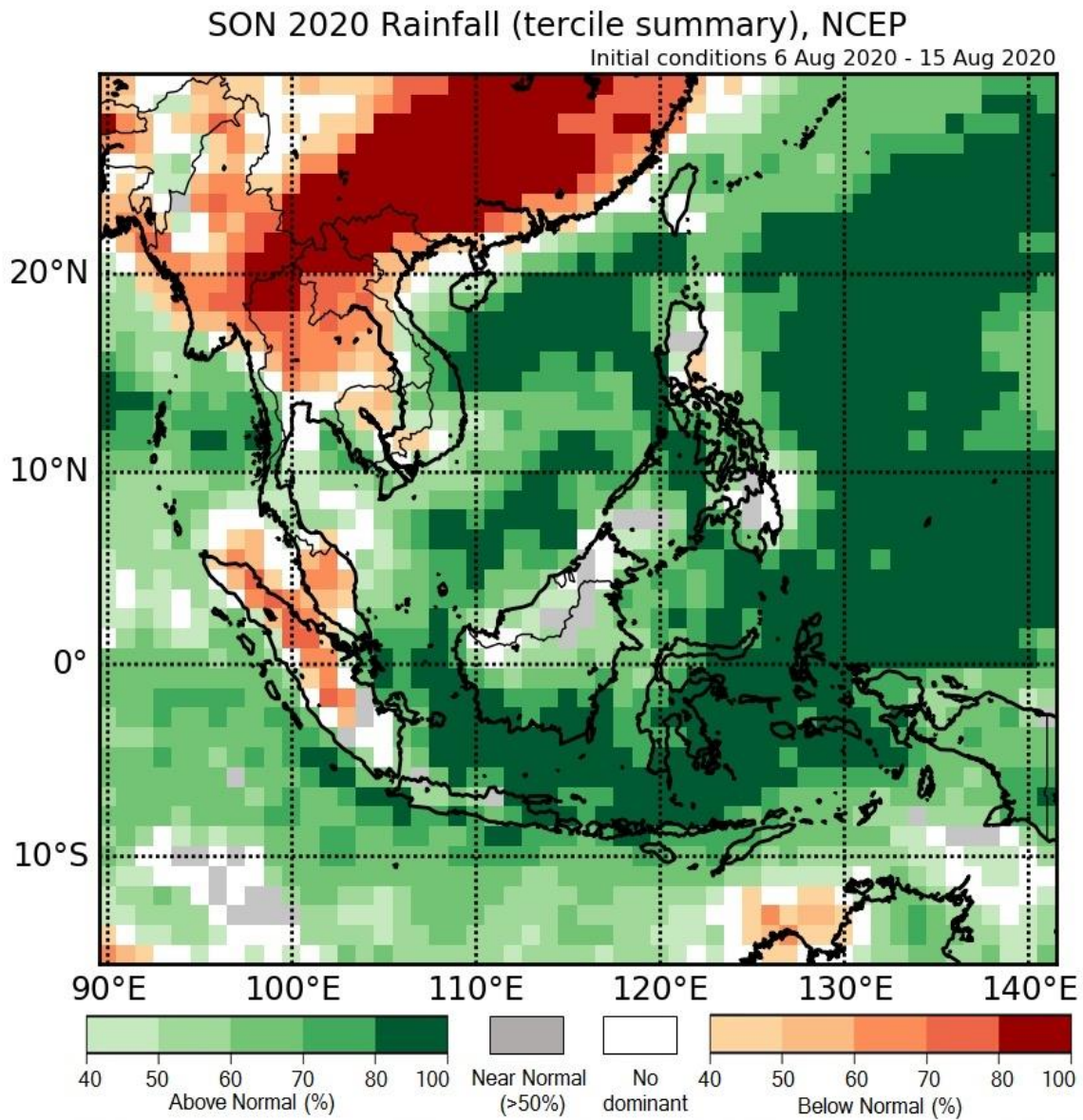


Figure 2. Predicted rainfall over Asian Countries by ASMC

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 2.5 mm to 266 mm at different stations along the LMB from Paksane in Lao PDR to Kratie in Cambodia. The highest rainfall during this week was accumulated in the upper part of the LMB from Lao Thailand’s Chiang Saen to Lao PDR’s Vientiane area (ranging from 100 mm to 266 mm), higher than 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.

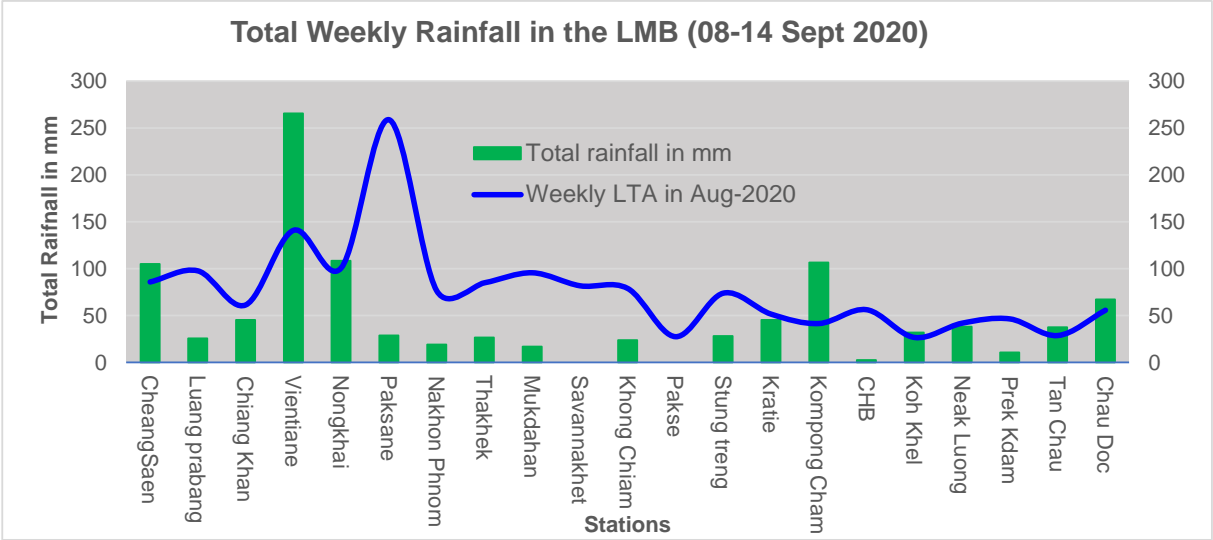


Figure 3. The weekly total rainfall over the LMB

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 September 8 to 14.

The situation during this reporting week is comparable to that of last week, except that the amount of rainfall this week (2.5 – 266 mm) was considered higher than average at the upper part of the basin from Chiang Saen to Vientiane area, but lower than average at the middle part from Paksane to Pakse of Lao PDR.

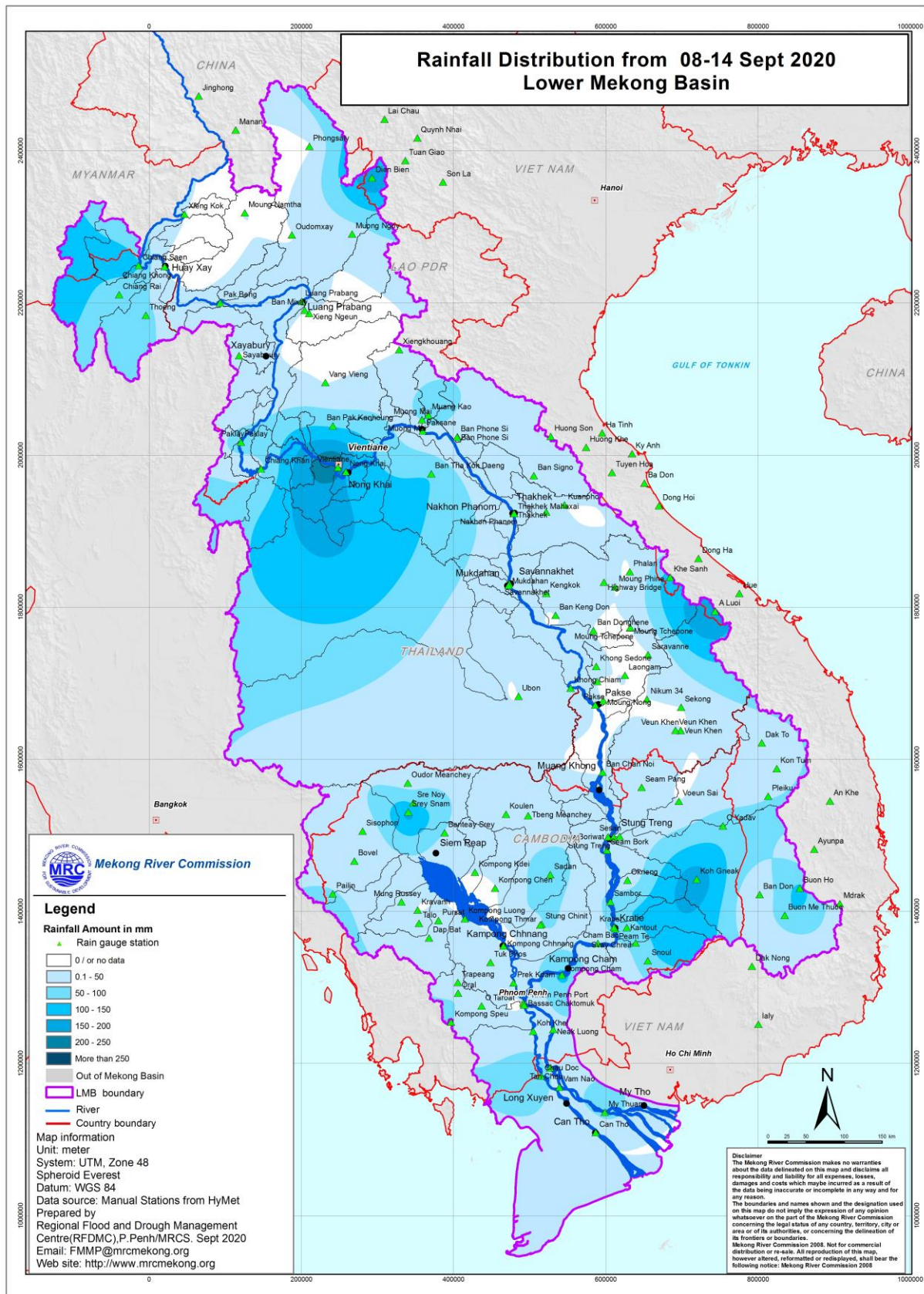


Figure 4. The weekly rainfall distribution over the LMB

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 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 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>.

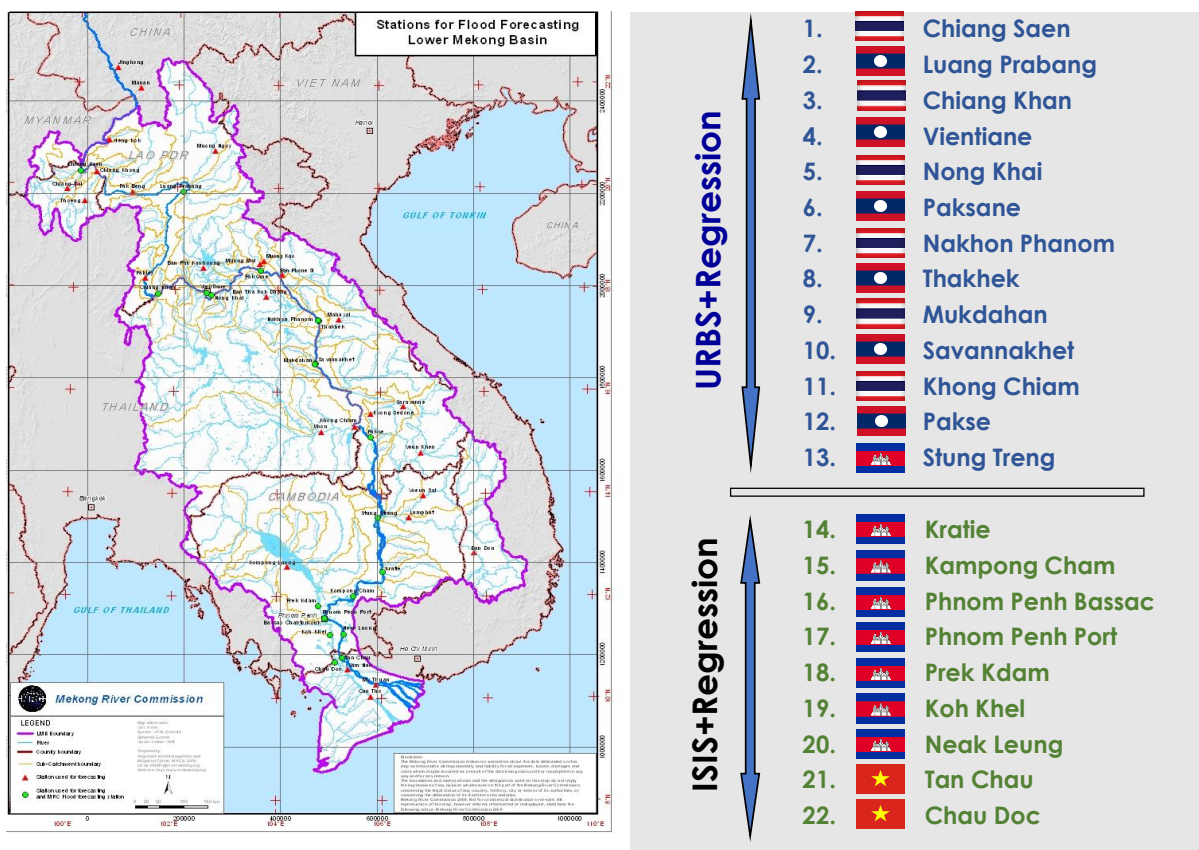


Figure 5. Key stations and model application for River Monitoring and Flood Forecasting

Chiang Saen and Luang Prabang

Water levels during September 8-14 at Chiang Saen station in Thailand were fluctuating, varying between -0.44 metres and 0.39 metres 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 levels at Luang Prabang monitoring station in Lao PDR were also slightly fluctuating between -0.62 metres and 0.34 metres during the reporting period. Compared to last week, the figure shows an increasing number, from 9.56 metres to 9.94 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 possibly change very rapidly during the wet season.**

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Chiang Khan increased from 7.08 metres last week to 7.92 metres this week, standing 3.25 metres lower than its LTA value. The level is at minimum record 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 fluctuation varied between -0.51 and 0.20 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 very much similar, except that at Paksane of which water level dropped sharply to its minimum level which is a very critical condition.**

Nakhon Phanom to Pakse

Similarly, water levels from Nakhon Phanom in Thailand to Pakse in Lao PDR continued decreasing during the reporting period, ranging between -0.30 and -0.09 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 dropping about 1 metre below their historical minimum levels. **During this week, water levels at the two stations were even lower than their historical minimum values and is considered critical.**

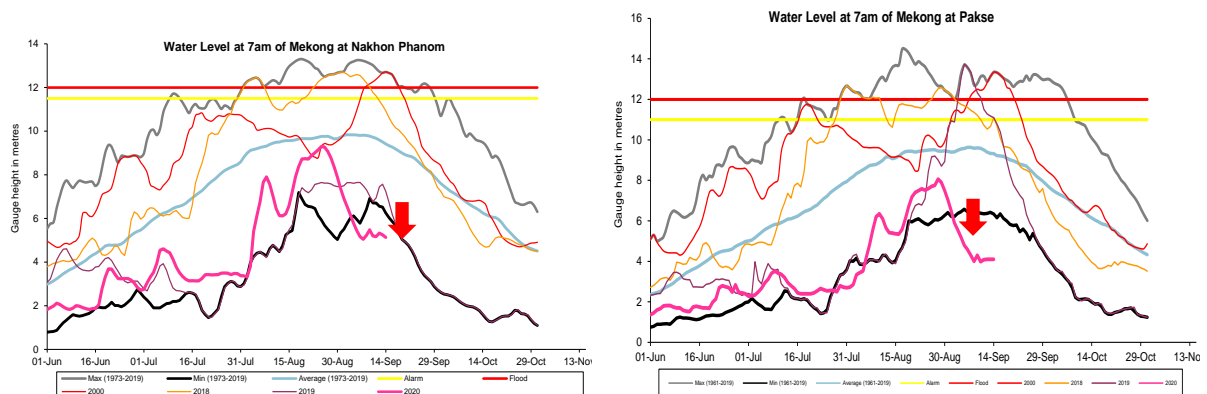


Figure 6. Water levels at Nakhon Phanom of Thailand and Pakse of Lao PDR

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

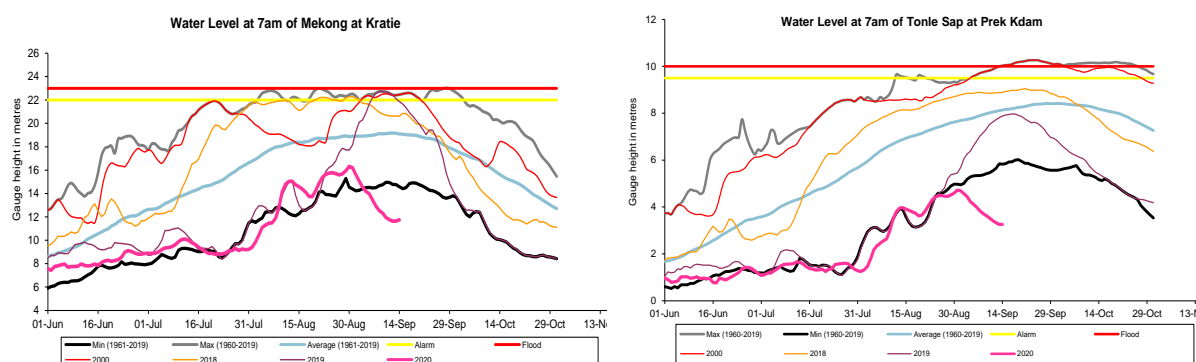


Figure 7. Water levels at Kratie on Mekong River and Prek Kdam on Tonle Sap River

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 14 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 14 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 14) 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.

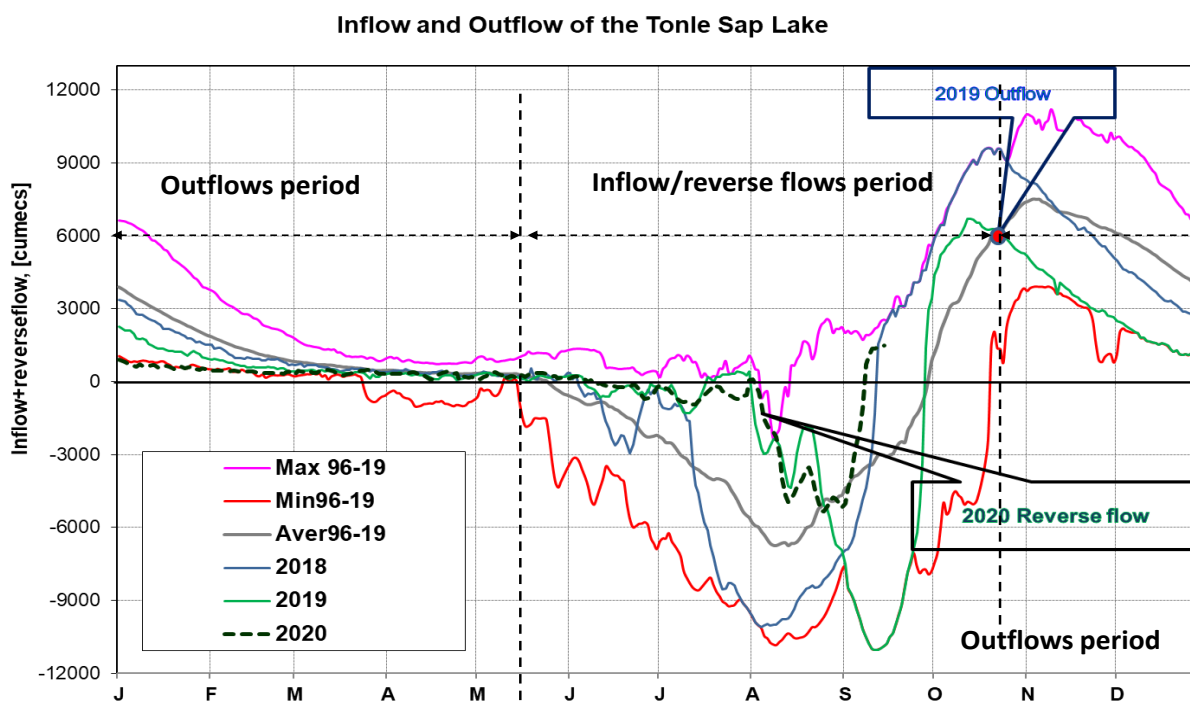


Figure 8. The seasonal change of inflows and outflows of Tonle Sap Lake

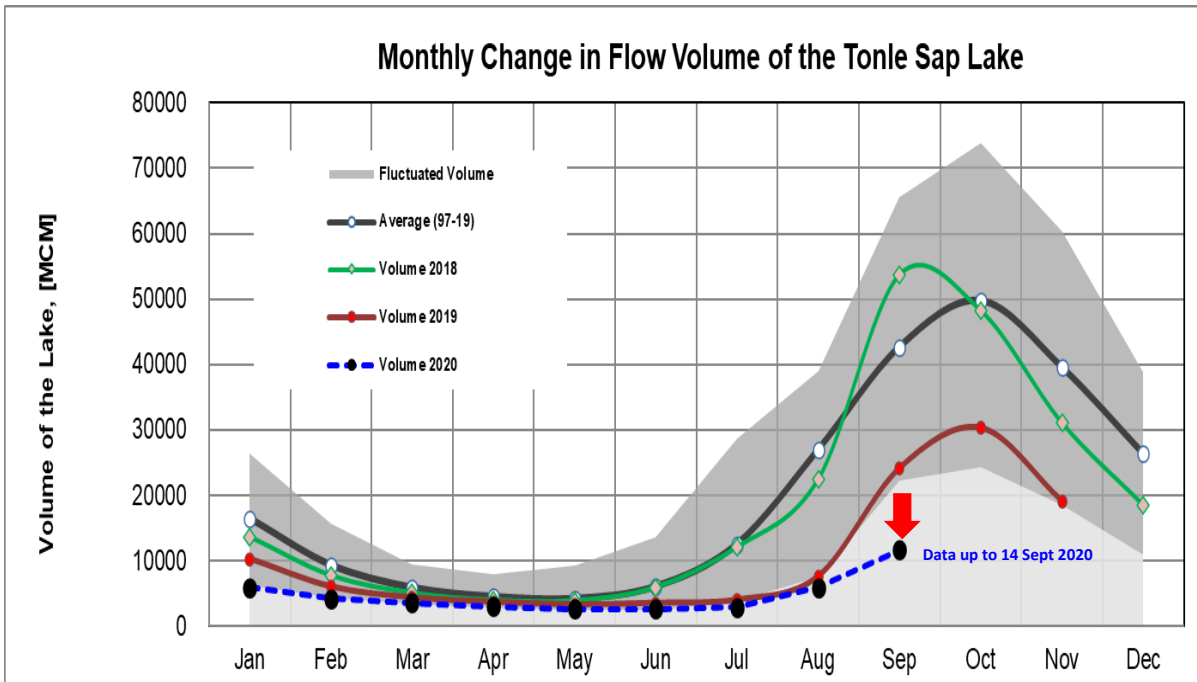


Figure 9. The seasonal change in monthly flow volume of Tonle Sap Lake

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	11620.82	
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						
Unit: Million Cubic Meter (1 MCM= 0.001 Km ³)							


4 Flash Flood in the Lower Mekong Basin

During September 8 -14, the heavy rainfall concentrated in some areas from the upper part (Thailand) to the middle part (Lao PDR) caused by Low Pressure (L). According to the MRC-Flash Flood Guidance System (FFGS) and analysis, the flash flood events were detected as low- and moderate-risk in some areas of the provinces namely Nghe An and Hoa Binh of Viet Nam and Xiengkhoang of Lao PDR.

Figure 10 and table 2 show the Flash Flood Guidance (FFG) results for the next 01, 03 and 06 hours produced on 8 Sep 2020 at 00:00 UTC (07:00 AM local time).

Table 2: Detected flash flood in Viet Nam and Lao PDR on 8 Sep 2020

 Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Viet Nam												
Date of FFG products: 08/09/2020 00:00 UTC time												
01-Hour Flash Flood Risk and Location				3-Hour Flash Flood Risk and Location in Vietnam				6-Hour Flash Flood Risk and Location in Vietnam				
Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks	Provinces	Districts	Region	Level Risks	
Nghe An	Tuong Duong	North Central	Low-Risk	Nghe An	Tuong Duong	North Central	Moderate-Risk	Nghe An	Tuong Duong	North Central	Moderate-Risk	
Hoa Binh	Ky Son	Northwest	Low-Risk	Nghe An	Con Cuong	North Central	Low-Risk	Nghe An	Con Cuong	North Central	Low-Risk	
				Hoa Binh	Ky Son	Northwest	Moderate-Risk	Hoa Binh	Ky Son	Northwest	Moderate-Risk	
				Nghe An	Anh Son	North Central	Low-Risk	Nghe An	Anh Son	North Central	Low-Risk	

 Rate-risk and location of the flash flood may occur in the next 1, 3, and 6 hours in Lao PDR														
Date of FFG products: 08/09/2020 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
NO ANY DETECTION OF FLASH FLOOD WITHIN NEXT 01-HOUR					Xiengkhuang	Khoune	POUNG	Northeast	Moderate-Risk	Xiengkhuang	Khoune	POUNG	Northeast	Moderate-Risk
					Xiengkhuang	Nonghed	PHAPHEU	Northeast	Low-Risk	Xiengkhuang	Nonghed	PHAPHEU	Northeast	Low-Risk

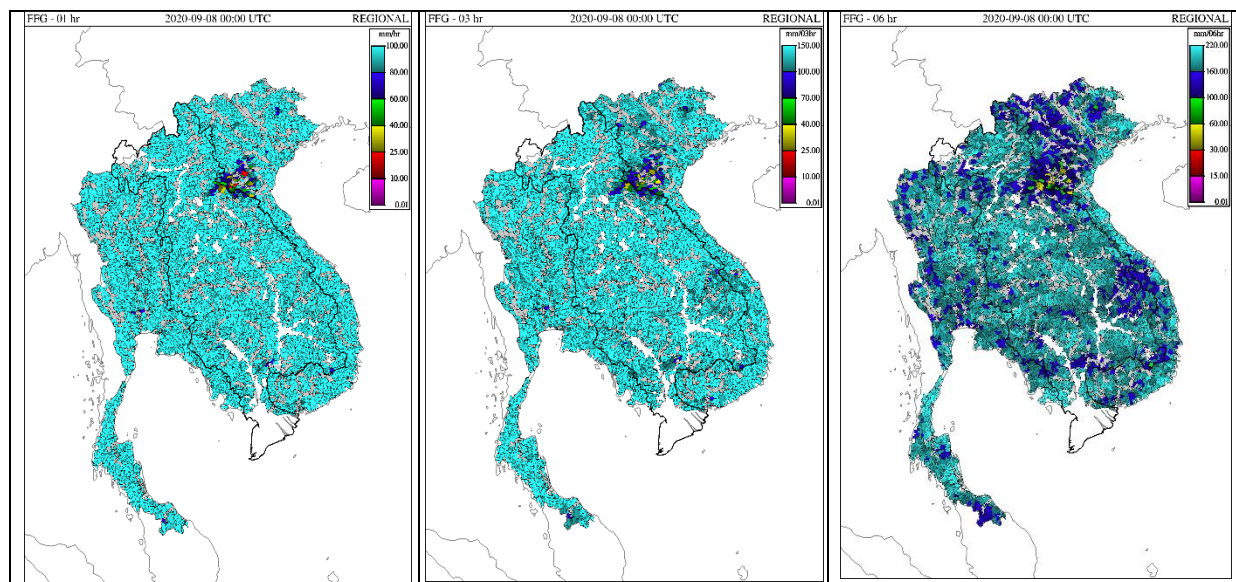


Figure 10. Flash Flood Guidance (FFG) for the next 1, 3 and 6 hours on Sep 8 at 00:00 UTC

5 Drought Monitoring in the Lower Mekong Basin

Weekly drought monitoring from September 3-9

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 3-9, as shown in Figure 11, is getting worse comparing to previous week. Meteorological indicator of SPI shows severe dry in the lower part of north-eastern Thailand and Mekong Delta of Vietnam covering Buriram, Surin Si Saket, Ubon western Ubon Ratchathani, southern Khon Kaen, Maha Sarakham, Roi Et, Yasothon, Amnat Charoen, some part of Mudahan, Sakon Nakhon, Nakhon Phanom, Ca Mau, Bac Lieu, Soc Trang, Kien Giang, Can Tho, and Long An. Some severe dry also took place in Cambodia including Svay Rieng, Kampong Thom, Ratanak Kiri, and Preh Vihea. In Lao PDR, the severe dry took place in the north covering Oudomxay, and some part of Phongsaly and Luanprabang.

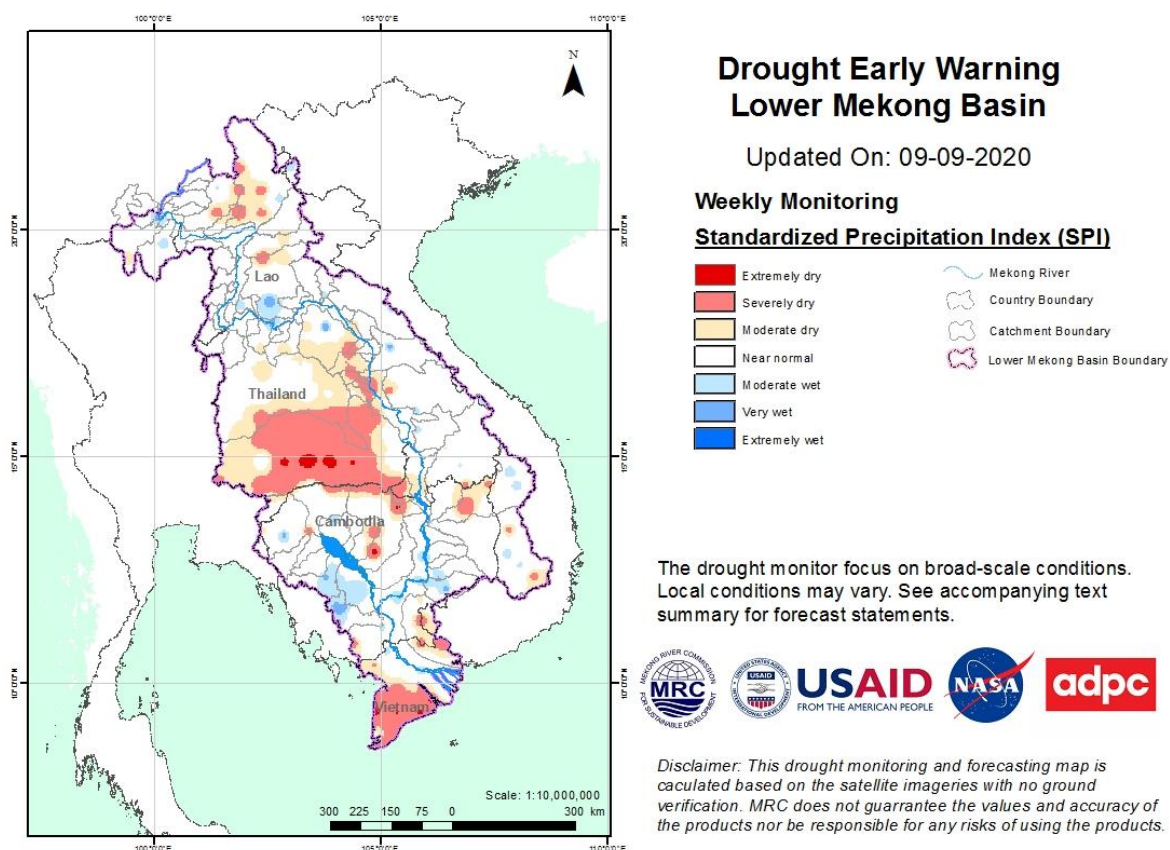


Figure 11. Weekly standardised precipitation index from September 3-9

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

During the week from September 3-9, the agricultural indicator through soil moisture anomaly index in northern and western parts do not change much from the previous week (August 27 to September 2). However, the condition in Cambodia and north-eastern Thailand is getting drier in some parts. As shown in Figure 12, the driest soil moisture condition is found in the northern LMB including Chiang Mai, Chiang Rai, Phayao, Xayabury, Luang Prabang, Luangnamtha, and Oudomxay ranging from moderate to extreme dry. North-west of Loei, east of Savanakheth, west of Quang Tri, and Ubon Ratchathani were also at severely dry condition. Besides the areas above, severe dry also hit the lower part of the LMB covering Cambodia and Viet Nam including some part of Kampong Thom, Kampong Chhnang, Kampong Speu, Mondul Kiri, Dak Lak, Gia Lai, and Kon Tum. Most parts of north-eastern Thailand were at moderate dry from September 3-9.

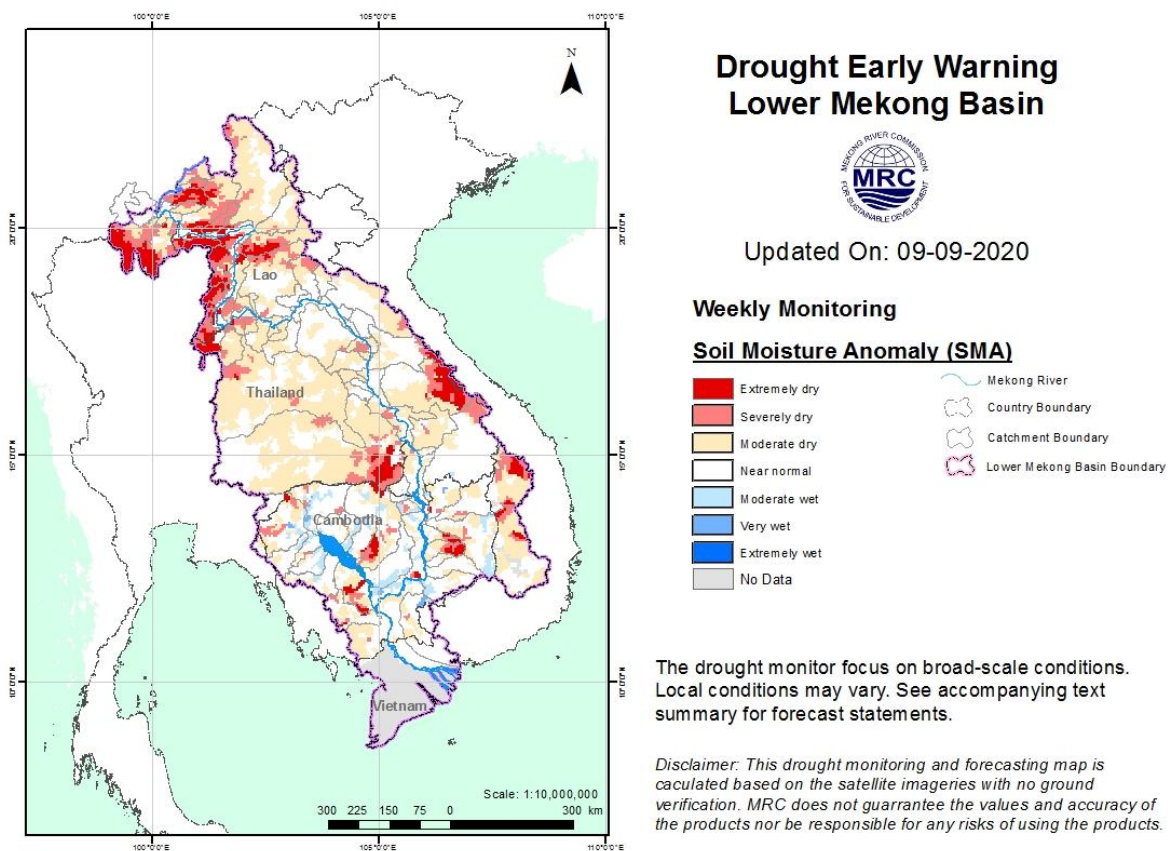


Figure 12. Weekly Soil Moisture Anomaly from September 3-9

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

The overall drought condition through combined drought index, as shown in Figure 13, shows the driest areas in the north and central part of the LMB during the reporting week from September 3-9. In the northern part, moderate and severe dry took part in some areas of Chiang Mai, Chiang Rai, Phayao, Leo, Xayabury, Luangprabang, Oudomxay and Luangnamtha. In central part, severe dry took place in Buriram, Surin, Si Saket, Ubon Ratchathani, Amnat Chamroen, Yasothon, Roi Et, Maha Sarakham, Nakhon Ratchasima, Khon Kaen, and Nakhon Phanom. Small part of Kampong Thom was also at severe dry condition. Besides that, central

and southern Lao PDR, Cambodia and Viet Nam were at normal condition except east of Sovannakhet and west of Quan Tri which were at moderate dry during the monitoring week. CDI values show that drought condition is a bit drier in the northern and central parts of LMB compared to last week from August 27 to September 2.

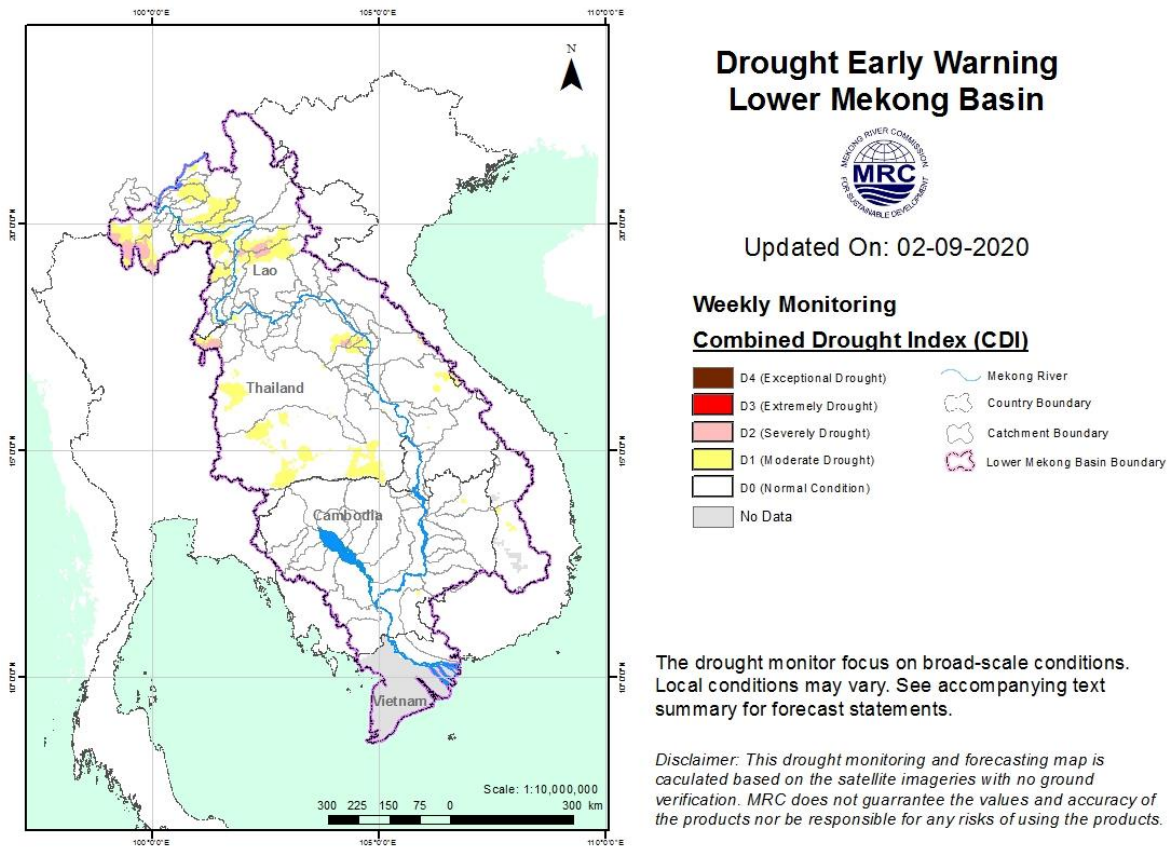


Figure 13. Weekly Combined Drought Index from September 2-9

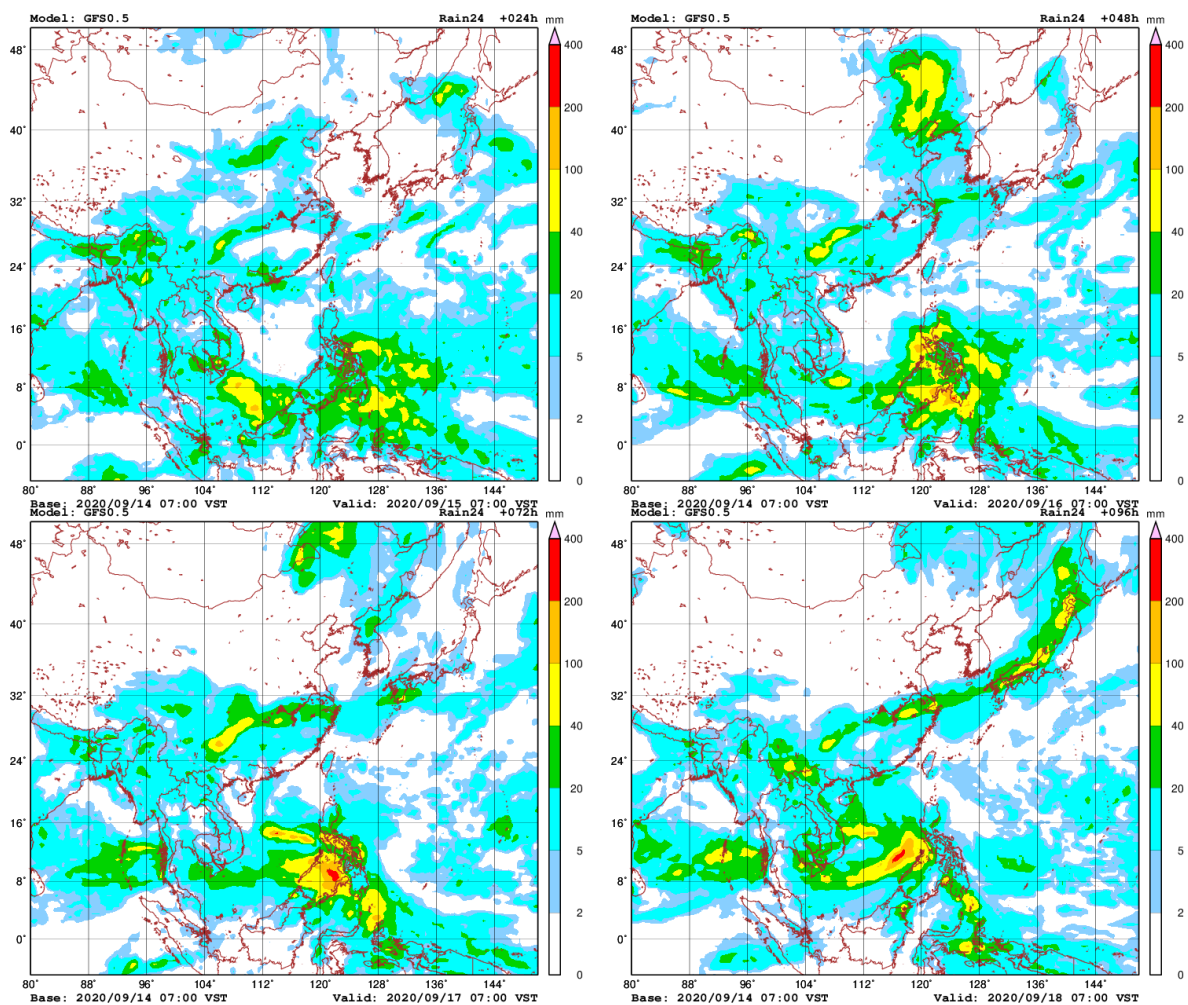
More information on Drought Early Warning and Forecasting as well as the explanation is available here: <http://droughtforecast.mrcmekong.org/templates/view/our-product>

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 three factors affecting the LMB region. They include (i) Intertropical Convergence Zone (ITCZ) going through the upper to the middle parts, (ii) Sub-Tropical High Pressure, and (iii) tropical depression with a strong operator in north-central parts of Viet Nam which covers areas in Lao PDR and Thailand. According to the accumulated rainfall forecast (24 hrs) of Global Forecast System (GFS) model, the small rainfall (10 – 20 mm/24hrs) and moderate rainfall (20 – 40 mm/24hrs) in over LMB will possibly occur in the first and the last days of the coming week. From September 19-20 the heavy rainfall (>100 mm/24hrs) will possibly take place in certain areas of Lao PDR, Thailand, and Viet Nam.

[Figure 14](#) shows the accumulated rainfall forecast (24hrs) of the GFS model from September 15 through 21.



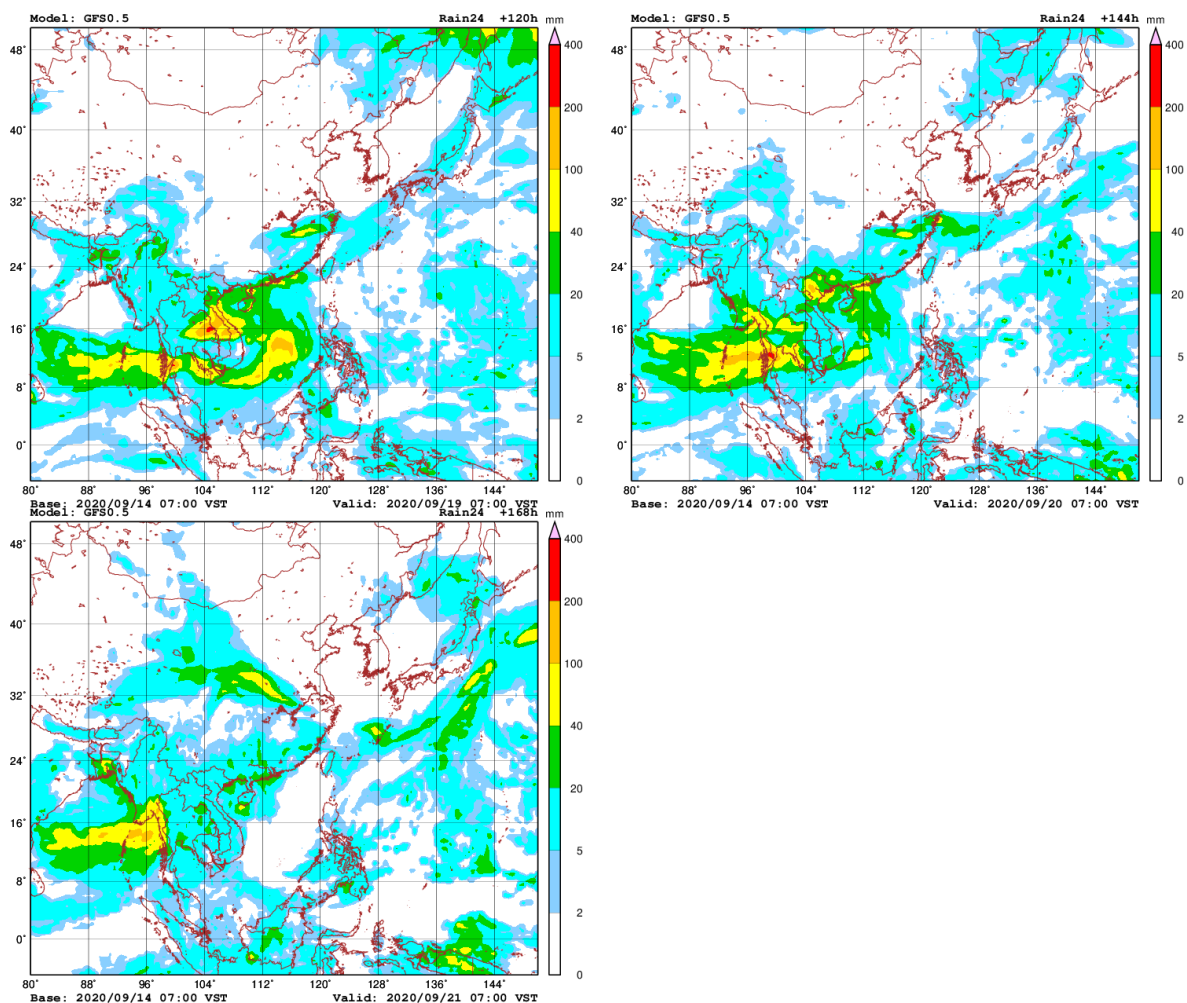


Figure 14. Accumulated rainfall forecast (24 hrs) of model GFS¹

6.2 Water level forecast

Chiang Saen and Luang Prabang

Based on the daily flood bulletin of September 14, daily forecast water level at Chiang Saen is expected to slightly increase from 3.39 to 3.72 metres in the next five days.

For Luang Prabang, the water levels will also increase from about 10.08 to 10.59 metres during the same period.

The trend of water levels at those stations is to continue staying below their LTAs.

Chiang Khan, Vientiane-Nong Khai and Paksane

Water level at Vientiane station is forecasted to go up from 4.63 to 5.18 metres. While at Paksane, the level will increase slightly from 6.21 to 6.62 metres in the next five days. Small quantity of precipitation is forecasted in the area. Despite that, the water levels here will still be lower than their LTAs.

¹ Source: <https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/global-forecast-system-gfs>

Nakhon Phanom to Pakse

Water levels at these stations are also likely to slightly increase by 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, water levels will slightly increase about 0.05 metres in the next five days.

Water levels of the Tonle Sap Lake at Prek Kdam and Phnom Penh Port will slightly increase about 0.04 metres over the next five days. Water levels at Phnom Penh, Chaktomuk, and Koh Khel on the Bassac River will increase about 0.05 metres during the same period.

The water levels at these stations will continue staying below their 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 3](#) 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 certain areas in Lao PDR, Thailand, 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:

[Click on this link to download the flash flood risk areas in excel format.](#)

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.

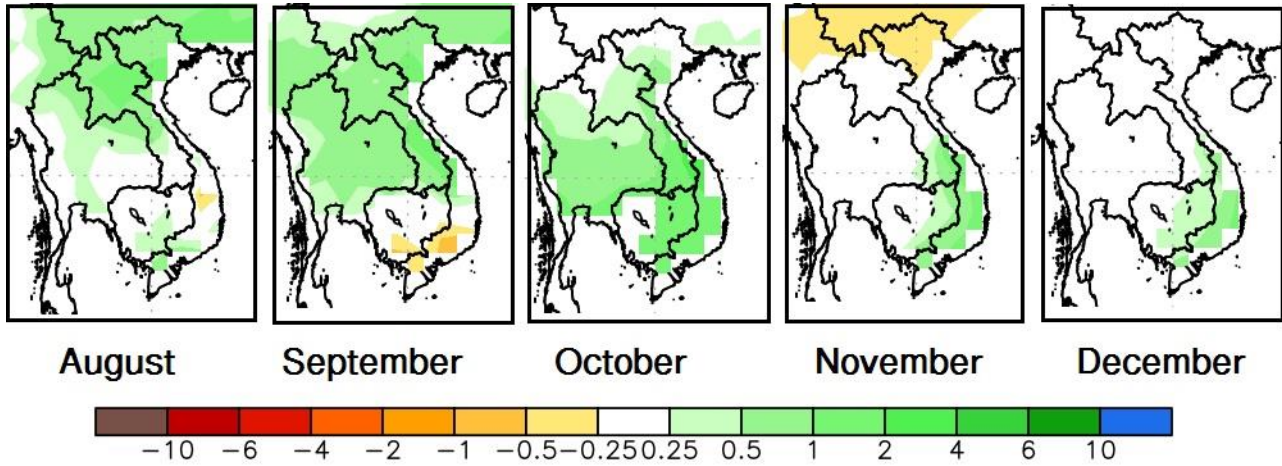


Figure 15. Daily average monthly rainfall forecast from Aug to Dec 2020

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 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@mrcremekong.org

River Flood Forecast: 15 - 19 September 2020

Date: 14 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												
							13-Sep	14-Sep	15-Sep	16-Sep	17-Sep	18-Sep	19-Sep	14	15	16	17	18	19					
Jinghong		1.5				535.60	535.60											X	X	X	X	X	X	
Chiang Saen		0.0	357.110	12.80	11.50	3.28	3.33	3.39	3.51	3.62														
Luang Prabang		0.0	267.195	18.00	17.50	9.85	9.94	10.05	10.21	10.30	10.45	10.58												
Chiang Khan		1.2	194.118	18.00	14.50	7.66	7.92	8.02	8.12	8.20														
Vientiane		nr	158.040	12.50	11.50	4.54	4.63	4.76	4.87	4.98	5.07	5.18												
Nongkhal		0.0	153.648	12.30	11.40	4.65	4.91	5.11	5.24	5.36														
Paksane		nr	142.125	14.50	13.50	6.25	6.21	6.30	6.40	6.47	6.55	6.62												
Nakhon Phanom		0.0	130.361	12.00	11.50	5.25	5.13	5.10	5.15	5.21														
Thakhek		nr	129.629	14.00	13.00	6.43	6.34	6.31	6.37	6.45	6.50	6.56												
Mukdahan		0.0	124.219	12.50	12.00	5.05	4.96	4.91	4.89	4.93														
Savannakhet		nr	125.410	13.00	12.00	3.66	3.64	3.61	3.59	3.61	3.64	3.66												
Khong Chiam		15.5	89.030	14.50	13.50	5.51	5.52	5.58	5.61	5.64														
Paksae		nr	86.490	13.00	11.00	4.10	4.10	4.14	4.16	4.18	4.22	4.27												
Stung Treng		11.0	36.790	12.00	10.70	4.75	4.74	4.73	4.75	4.77	4.79	4.82												
Kratie		0.0	-0.101	23.00	22.00	11.65	11.75	11.72	11.70	11.74	11.77	11.80												
Kompong Cham		40.4	-0.930	18.20	15.20	6.48	6.51	6.61	6.57	6.55	6.60	6.65												
Phnom Penh (Bassac)		0.2	-1.020	12.00	10.50	4.12	4.06	4.11	4.10	4.09	4.12	4.15												
Phnom Penh Port		nr	0.070	11.00	9.50	3.14	3.08	3.13	3.11	3.10	3.13	3.17												
Koh Khel		0.3	-1.000	7.90	7.40	3.80	3.81	3.84	3.83	3.84	3.86	3.88												
Neak Loong		0.0	-0.330	8.00	7.50	3.02	3.00	3.01	3.06	3.04	3.04	3.07												
Prek Kdam		0.0	0.080	10.00	9.50	3.26	3.26	3.30	3.28	3.26	3.30	3.33												
Tan Chau		27.5	0.000	4.50	3.50	1.47	1.64	1.71	1.74	1.78	1.78	1.79												
Chau Doc		60.0	0.000	4.00	3.00	1.49	1.71	1.81	1.86	1.89	1.91	1.93												

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 Paksae 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

K. Soth
 KHEM Sothas

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://www.mrcmekong.org/bulletin_wat.php, <http://www.mrcmekong.org/report/flood.php>

7 Summary and Possible Implications

7.1 Rainfall and its forecast

Rainfall during this reporting week was considered below average at the middle and lower parts. However, at the upper part it was above average, varying from 2.5 mm to 266 mm at different stations along the LMB from Chiang Saen in Thailand to Vientiane in Lao PDR. The highest concentration was in the upper part of the LMB from Chaing Saen to Vientiane area (up to 266 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 14, 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 GFS data, rainfall is likely to take place in areas between Lao PDR's Paksane and the Central highland of Vietnam, varying from 50 mm to 200 mm in September 20. 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 the middle to the lower parts 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 slightly increasing, ranging from 0.05 and 0.15 metres. This means 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, Thailand, and Viet Nam during next week. Some local communities of the LMB are also expected to receive heavy rain which could lead to flash floods.

7.4 Drought condition and its forecast

Drought condition of the LMB from September 3-9 was drier in the north and central parts of the LMB. Severe drought condition was found in Chiang Mai, Chiang Rai, Phayao, Leo, Xayabury, Luangprabang, Oudomxay, Luangnamtha, Buriram, Surin, Si Saket, Ubon Ratchathani, Amnat Chamroen, Yasothon, Roi Et, Maha Sarakham, Nakhon Ratchasima, Khon Kaen, Nakhon Phanom, and Kampong Thom.

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.

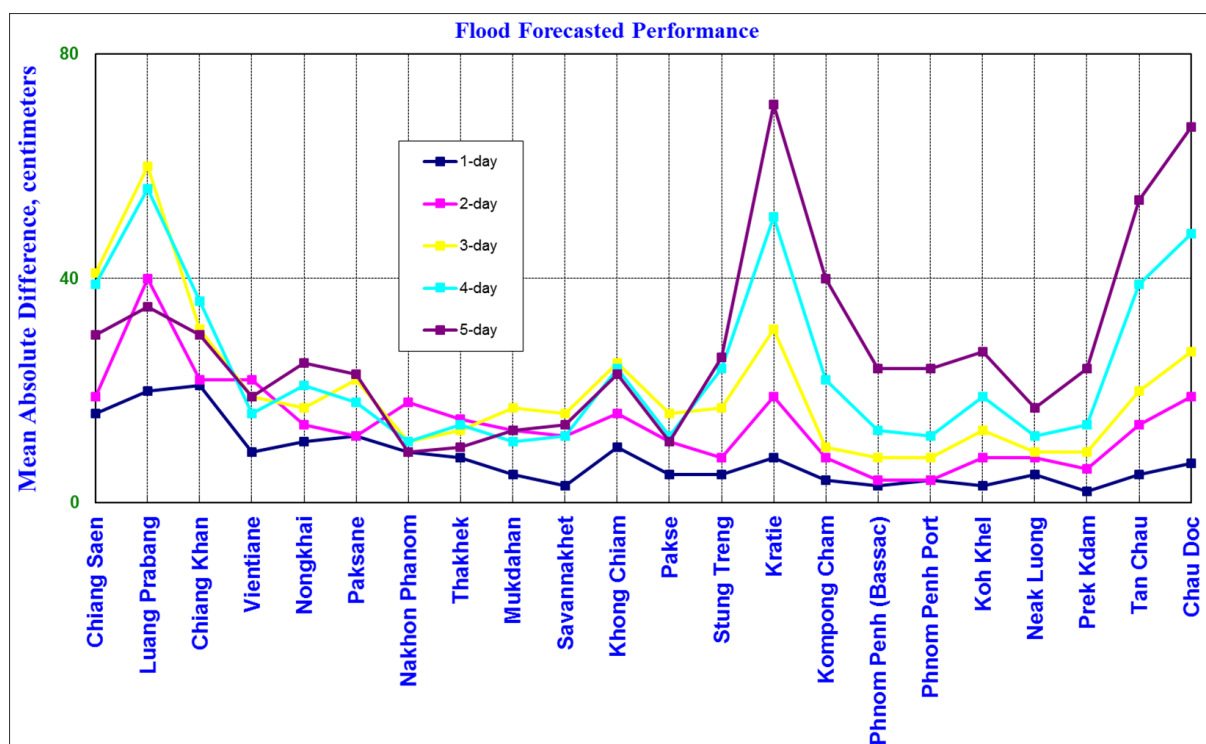
Annex 1: Performance of the weekly flood forecasting

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 08 to 14 September 2020.

The forecasting values from 08 to 14 September 2020 show that the overall accuracy is fair for 1-day to 3-day forecast in lead time at stations in the middle part of the Mekong River from Luang Prabang to Kratie due to the effect of 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 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 08 – 14 September 2020.

Table B1: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 08 to 14 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>20</u>	<u>21</u>	9	11	12	9	8	5	3	10	5	5	8	4	3	4	3	5	2	5	7
2-day	19	<u>40</u>	<u>22</u>	<u>22</u>	14	12	18	15	13	12	16	11	8	19	8	4	4	8	8	6	14	19
3-day	<u>41</u>	60	<u>31</u>	19	17	<u>22</u>	11	13	17	16	<u>25</u>	16	17	<u>31</u>	10	8	8	13	9	9	<u>20</u>	<u>27</u>
4-day	<u>39</u>	56	<u>36</u>	16	<u>21</u>	18	11	14	11	12	<u>24</u>	12	<u>24</u>	51	<u>22</u>	13	12	19	12	14	<u>39</u>	<u>48</u>
5-day	<u>30</u>	<u>35</u>	<u>30</u>	19	<u>25</u>	<u>23</u>	9	10	13	14	<u>23</u>	11	<u>26</u>	71	<u>40</u>	<u>24</u>	<u>24</u>	<u>27</u>	17	<u>24</u>	54	67

Table B2: The Mean Absolute Difference (Error) of Flood Forecasting base on old defined Benchmark from 08 to 14 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	71.4	71.4	<u>42.9</u>	71.4	57.1	<u>42.9</u>	71.4	57.1	71.4	71.4	85.7	71.4	<u>42.9</u>	71.4	57.1	71.4	<u>42.9</u>	57.1	57.1	57.1	71.4	71.4	71.4	63.0
2-day	66.7	66.7	<u>50.0</u>	66.7	<u>50.0</u>	66.7	<u>50.0</u>	66.7	66.7	66.7	66.7	66.7	83.3	66.7	66.7	<u>50.0</u>	66.7	66.7	66.7	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	62.1
3-day	<u>40.0</u>	<u>40.0</u>	60.0	60.0	60.0	60.0	60.0	80.0	<u>40.0</u>	60.0	60.0	80.0	60.0	<u>40.0</u>	60.0	60.0	60.0	<u>40.0</u>	80.0	<u>40.0</u>	60.0	60.0	60.0	57.3
4-day	<u>50.0</u>	<u>50.0</u>	<u>25.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	75.0	<u>50.0</u>	75.0	<u>50.0</u>	75.0	75.0	<u>50.0</u>	<u>25.0</u>	75.0	75.0	75.0	75.0	<u>50.0</u>	75.0	<u>50.0</u>	<u>50.0</u>	<u>50.0</u>	59.1
5-day	66.7	66.7	66.7	66.7	66.7	66.7	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>	66.7	<u>33.3</u>	66.7	66.7	66.7	62.1

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 08 to 14 September 2020

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
week	10:18	00:00	-	-	08:15	07:10	07:06	08:00	07:30	08:30	07:01	08:21	0	0	2	0	76	0	1	0
month	10:24	00:00	-	-	08:15	07:10	07:38	08:11	08:39	08:26	07:14	08:09	0	0	37	0	464	0	2	38

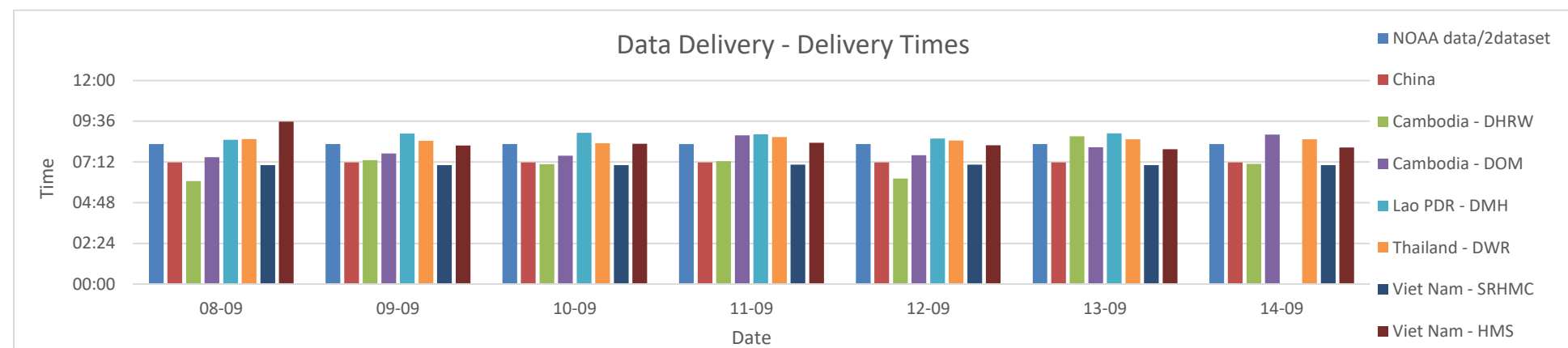


Fig. B4: Data delivery times for the past 8 days from 08 to 14 September 2020

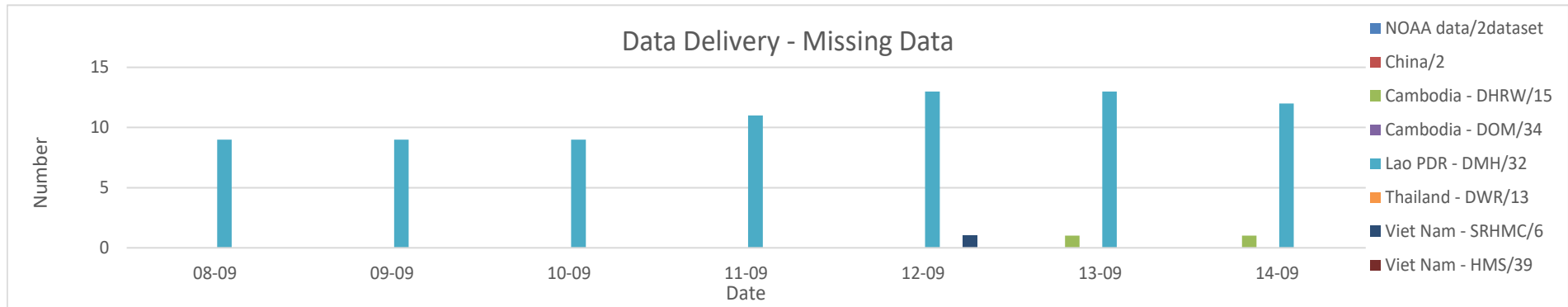


Fig. B5: Missing data for the past 7 days from 08 to 14 September 2020

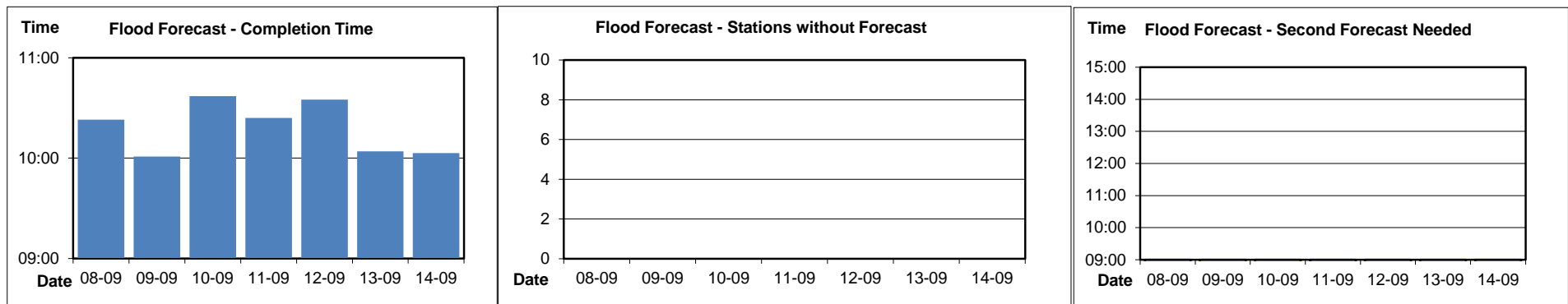


Fig. B6: Flood forecast completion time, stations without forecasts, and second forecasts need from 08 to 14 September 2020



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